Chemical Age

LURGI AND G.I. PROCESSES CRITICISED
(page 235)

VOL. 83 No. 2117

6 February 1960

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

(Continued on page 224)

CHEAPER TECHNICAL GRADE CHLOROFORM

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TYPICAL CHARACTERISTICS

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Residue on evaporation at 110°C	%	<0.001
Moisture H_2O	%	0.023
Acidity as HCl	%	0.0001

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LONDON S.W.1

ICI
GENERAL CHEMICALS DIVISION

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INDEX TO ADVERTISERS

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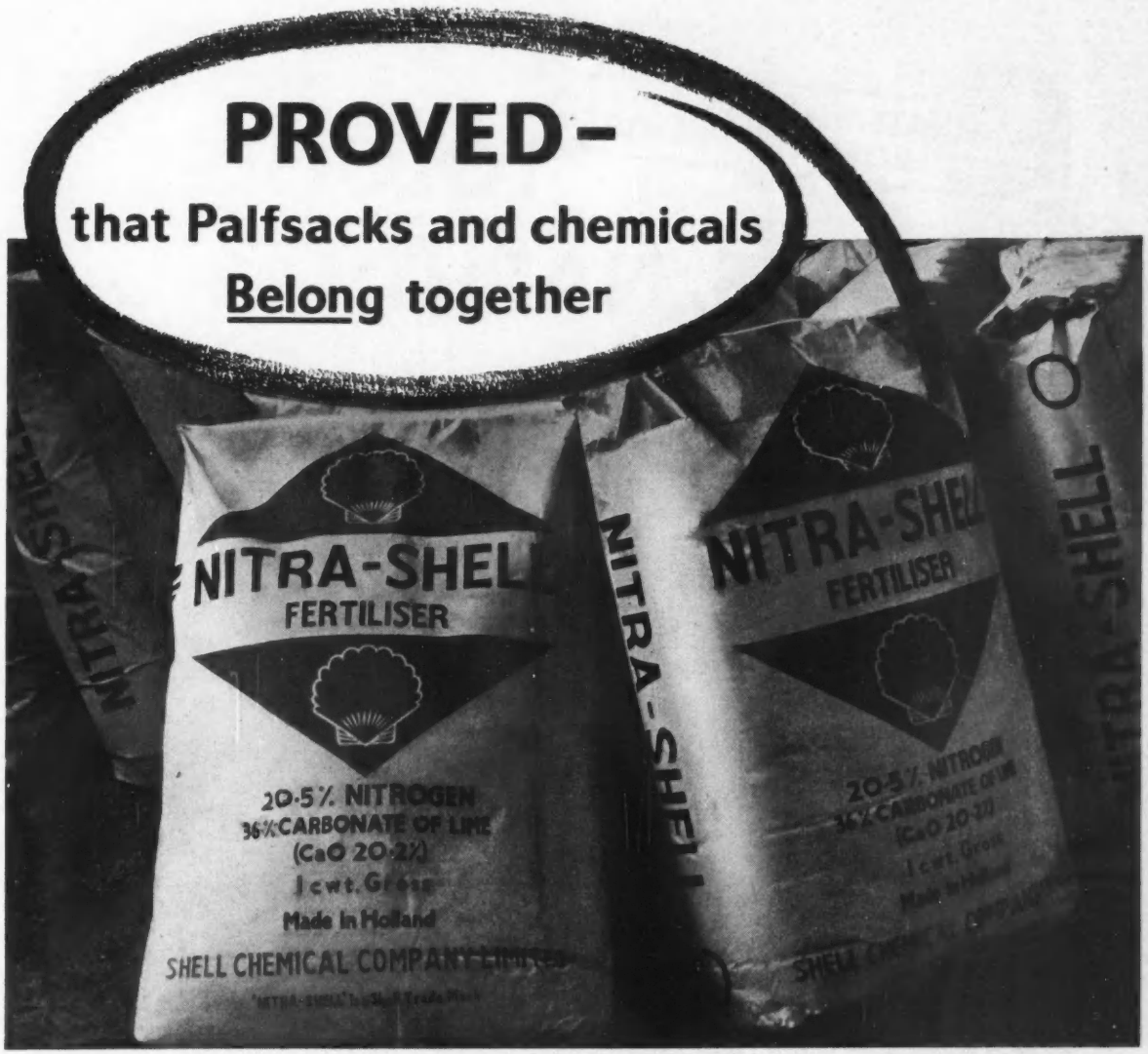

Look at these sacks. They're PALFSACKS — multi-wall paper sacks by William Palfrey — each one filled with Shell Chemicals' NITRA-SHELL Fertiliser. And why do Shell Chemicals use PALFSACKS? Here is their own statement:

"Tested in Store. *From April, 1956 to May, 1957, consignments of NITRA-SHELL were kept in several stores in different parts of the country, under widely varying conditions — all of them typical of commercial storage. In one store the bags were stacked directly on concrete, in another they were stacked thirty high and so on.*

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Not just paper sacks – but

PALFSACKS

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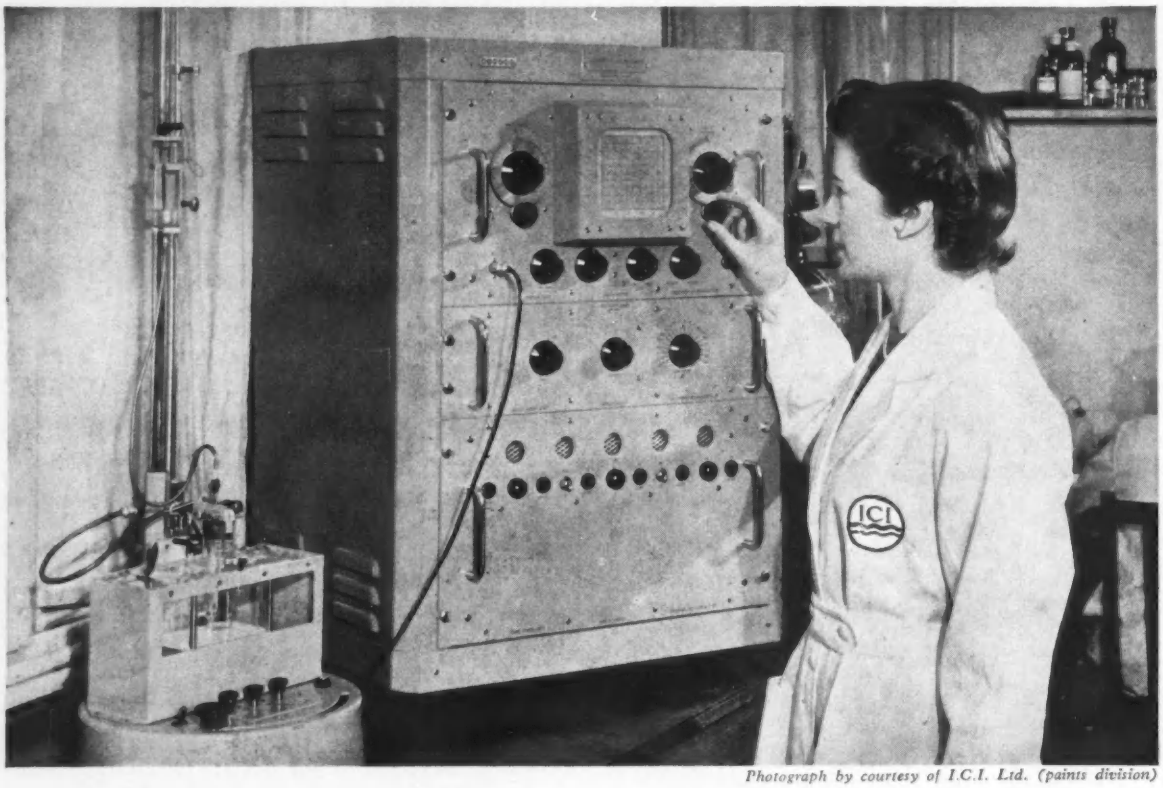

Photograph by courtesy of I.C.I. Ltd. (paints division)

Analysts all over the world have found how easy it is to get rapid and accurate analyses with our Cathode Ray Polarograph. It is quick in action, gives direct or derivative readings, and has that extra sensitivity you so often require.

Its easily readable peak polarograms repeat every seven seconds. Your laboratory is wasting expensive time without this indispensable instrument.

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DISPLAY. six-inch diameter cathode ray tube, with a 9cm. square graticule printed on its flat, long persistence screen.

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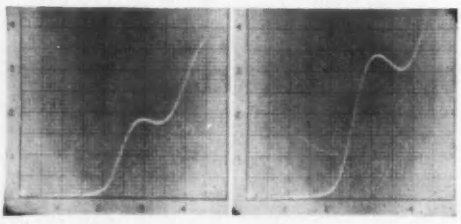
PLATE ONE PLATE TWO



TYPICAL APPLICATION FOR CATHODE RAY POLAROGRAPH

Determination of Cyanide in Effluent Sample. Introduce 5 ml. sample into two 10 ml volumetric flasks, into one flask add 0.2 ml. of a standard cyanide solution, (50 µg/ml. $CN^{'}$), and make each up to the mark with 0.2N NaOH. Shake well. Transfer 5 ml. from each flask into polarographic cells, and de-aerate with nitrogen for 3 mins. Record the polarograms applying anodic oxidation on start potential -0.4V and scale factor 1.0.

x µg $CN^{'}$ + 5 µg $CN^{'}$ = 34 divisions (Plate 2)

x µg $CN^{'}$ = 18.5 divisions (Plate 1)

$\therefore$ 5 µg $CN^{'}$ = 15.5 divisions

$$x = \frac{5 \times 18.5}{15.5} \text{ µg}$$

$$x = 6.0 \text{ µg}$$

Volume of sample in cell = 2.5 ml.

$\therefore$ Concentration of $CN^{'}$ in sample = 2.4 µg/ml.

Send now for "Trace Techniques" just published containing 30 new polarographic methods. Price 25/- post paid. (U.K. only.)

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IN THIS ISSUE

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CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

IN DEFENCE OF LURGI

AT a time when Britain's first Lurgi high-pressure complete gasification plant on the Scottish Gas Board's site at Westfield, Fife, is under construction, another is to be put up for the West Midlands Gas Board and gas integral (G.I.) gasification plants are in being at Kensal Green, London, and at Gloucester, it is surprising to learn of strong criticisms of these processes, and, in particular, of the Lurgi process. These criticisms have been raised by Dr. E. A. C. Chamberlain, divisional chief scientist for the Scottish Division of the National Coal Board, in a paper presented to a joint meeting of Scottish Junior Gas Associations held in Edinburgh recently. A survey of Dr. Chamberlain's paper is given in p. 235.

The author, who states that the views expressed are his own, declares that "The popular belief that the Lurgi plant can produce synthesis gas from any grade of coal and that it can be used in conjunction with a Fischer Tropsch unit to produce valuable hydrocarbons from otherwise unusable low grade fuels is unfortunately not true. Indeed the choice of suitable coals for Lurgi operation is very narrow." It will be noticed too, that he remarks "no mention has been made in the published literature on the Lurgi process to corrosion problems that may arise in the unit itself due to sulphur, nitrogen, chlorine and phosphorus. Dr. Chamberlain also says "Trials with British coal in a Lurgi convertor in Germany have necessarily been limited to a few hundred tons and there is no certain means of predicting the long term problems that may arise in practice."

The importance of this first Lurgi plant in Britain lies in the fact that it will enable the gas industry to use low-grade coal (over 350,000 tons) having a high ash and moisture content in place of more 400,000 tons of scarcer and more costly coals traditionally used for gas manufacture.

As planned, the Westfield plant will produce 30 million cu. ft. of gas a day from poor-quality non-coking opencast coal, mined adjacently.

After careful examination by the Gas Council, Scottish Gas Board, N.C.B., etc., a Lurgi plant was chosen for Westfield. The process, which originated in Germany before the start of the Second World War, represents a remarkable development in fuel technology, since it produces gas by chemical processes and practice from a type of coal completely unsuitable for carbonisation by conventional means. (See CHEMICAL AGE, 17 October 1959, p. 531.) Operational experience abroad and experimental work in this country, contrary to Dr. Chamberlain's assertions, have shown that the gas produced will have a heating value of just over 400 B.t.u. per cu. ft., while crude benzole will be recovered from the gas after it leaves the Lurgi generators and will be sold. Notable advantages of the process are that gas is produced having a low carbon monoxide and sulphur content and at such high pressures, about 250 p.s.i., it can be distributed through pipelines over considerable distances without using compressors.

There are many Lurgi plants now operating abroad: In Germany, at Dorsten and Böhlen; Czechoslovakia, at Brüx; Australia, at Morwell; South Africa, at Sasol; together with plants in Pakistan, Korea and one projected in Pennsylvania. There is also a large plant outside Moscow, which was developed from the Böhlen plant, although without the assistance of Lurgi.

Cost of enrichment from 400 B.t.u. to 450 B.t.u. must be an important factor in the economics of the Lurgi process, states Dr. Chamberlain, and he calculates that about 5 cwts of oil are required for every ton of coal gasified. "This means that when Westfield is in full operation, the annual oil consumption will be of the order of 100,000 tons." S.G.B. have said that to enrich the gas to 425 B.t.u. per cu. ft. butane, purchased from Grangemouth oil refinery, will be used. It is understood that the quantity of butane used will be some 2 cwt. per ton of coal and could be less.

With regard to the grade of coal, it is true that the Lurgi plant cannot use any grade of coal, but the range is fairly wide. The size range is from ¼ in. to 1¼ in. and not ¼ in. to 1 in, as stated. The size range of ¼ in. to 1¼ in. is the overall size range which it is believed from investigations a Lurgi plant could operate on, but there might have to be modifications of the plant to cover the whole range.

The final criterion as to whether or not a particular coal is suitable for gasification in a Lurgi generator is assessed on the results of the Lurgi assay. This has been carried out by Lurgi themselves and is backed by their considerable experience. In any case the Gas Council report for 1958-59 indicated that the Westfield plant was to some extent experimental and that further work on the use of British coals would be carried out on the full-scale plant.

Dr. Chamberlain's statement on corrosion problems is extraordinary to say the least. As has been noted above, there are a good many plants already operating throughout the world which indicates that designers of this type of plant have a fair idea what they are doing. Also experienced designers of chemical plant of the status of Humphreys and Glasgow, the U.K. Lurgi agents who are working with the S.G.B. in designing the plant that they are now erecting at Westfield, are unlikely to have overlooked any corrosion problems that might arise.

Of the G.I. process of Woodall-Duckham, it has been noted that generation at atmospheric pressure is a disadvantage when the gas is to be fed into a high pressure grid. To produce a gas at low pressure followed by compression is costly, not only because of the cost of compression, but because the equipment occupies more space, it is more difficult to remove the CO_2 diluent and thermal efficiency is lower. Also, although oxygen is not required in the G.I. process, the gas produced has a lower calorific value (340 B.t.u. cu. ft.).

The statement about deep mine coal is untrue as far as the Lurgi process is concerned, while Dr. Chamberlain's comparison between the coal cost for Lurgi and carbonising coal is incorrect. All the fines up to about 30% contained in coal supplied to a Lurgi gasification plant can be utilised for the steam and power production required by the process.

Dr. Chamberlain appears to favour the Koppers-Totzek process. This contains a large amount of CO_2 which must be removed and this is not easy at low pressures. Even after CO_2 is removed, the gas is of low calorific value and is unsuitable for grid transmission because of the cost of compression. Air separation plant required to produce the necessary oxygen is also expensive, both in operating and capital cost.

It must be pointed out that such experience of Lurgi plant as has been accumulated, provides sufficient information to predict accurately the long term problems that may arise in practice. And in any case if not the Lurgi process, what other process is there?

If there is a fault, it is the very late adoption in the U.K. of the Lurgi process. National policy at present has decided that it is essential to use poor quality coals. The Lurgi process is important, however, to the chemical industry as well as to the national economy, for it may be viewed as the basis of a chemical and fuel industry.

CHEMICAL EXPORTS

EXPORTS of British chemicals showed a steeper rise in 1959 than did exports of most other industrial sectors. As stated last week (see p. 204) our chemicals exports rose by 12% to £293 million over the 1958 figure. The increase for chemical elements and compounds was 17% to £70.3 million; for pigments, paints, dyestuffs, etc., 12% to 26.4 million; drugs and medicines, 7% to £40.1 million; soaps, toilet preparation, by 3% to £26.3 million.

The biggest increase in the chemical sector was for plastics materials which, valued at £40 million, were 24% higher than in 1958.

The 1959 export performance of the British chemical industry was therefore a fine one. It is interesting to record that in 1959 chemical shipments accounted for 8.8% of all U.K. exports, compared with 8.2% in 1958. 7.7% in 1954, 6.8% in 1948 and a 1935-38 average of only 6.3%.

The position is, however, somewhat marred by a closer study of U.K. trade with the two European trading blocs during 1958, which shows that imports increased more by percentage than did U.K. exports. Shipments to Common Market (E.E.C.) countries rose by 9.0% to £46.1 million, but imports from that area, at £56.5 million were higher by 17.0%. The adverse balance in chemical trade with the 'Six' was higher by £4.4 million, or 73.3%.

Shipments of chemicals to the 'Outer Seven', at £28.3 million increased by 15.9%; while imports from the area, at £15.6 million, showed an increase of 18.2%. The favourable balance of trade in chemicals with this area was higher by 13.3%.

U.K. Trade with 'Outer Seven'

	EXPORTS 1958	EXPORTS 1959	IMPORTS 1958	IMPORTS 1959
	£ million		£ million	
Austria	1.0	1.3	—	—
Denmark	5.2	5.6	0.6	0.6
Norway	4.6	5.2	3.5	4.0
Portugal	2.9	3.0	1.1	1.6
Sweden	7.6	9.5	2.9	3.1
Switzerland	3.1	3.7	5.1	6.3
	24.4	28.3	13.1	15.6

U.K. Trade with Common Market

	EXPORTS 1958	EXPORTS 1959	IMPORTS 1958	IMPORTS 1959
	£ million		£ million	
Belgium	6.2	6.8	4.2	5.6
France	7.7	7.0	11.0	12.6
W. Germany	10.5	11.0	21.4	24.0
Holland	9.9	11.9	8.4	10.3
Italy	7.7	9.3	3.0	4.0
	42.0	46.1	48.0	56.5

Holland became our largest European market for chemicals superseding West Germany; exports to that country also exceeded those to South Africa which showed a decline from the 1958 level of £12.3 million. U.K. chemical exports to the three main Commonwealth customers increased by 7.3% as is shown in the following table:

U.K. Exports to Three Main Commonwealth Markets

	EXPORTS 1958	EXPORTS 1959	IMPORTS 1958	IMPORTS 1959
	£ million		£ million	
Australia	23.4	24.1	0.5	0.4
India	12.3	15.7	0.7	0.6
South Africa	12.3	11.8	2.5	2.5
	48.0	51.6	3.7	3.5

Exports to Canada and the U.S., at a total value of £21.1 million, showed a 28.6% increase, while imports, valued at £42.6 million, were higher by 15.4%:

U.K. Trade with North America

	EXPORTS 1958	EXPORTS 1959	IMPORTS 1958	IMPORTS 1959
	£ million		£ million	
Canada	8.6	9.6	9.8	8.9
U.S.	7.8	11.5	27.1	33.7
	16.4	21.1	36.9	42.6

British Drug Houses Receive £7.4 Million Bid from Fisons

NOW bidding some £7.4 million for all the issued capital of British Drug Houses Ltd. are Fisons Ltd., who two week ago withdrew their £11 million cash counterbid for Crosse and Blackwell.

Terms of the offer, which will be made by Morgan Grenfell and Co., are one Fisons £1 ordinary plus 5s cash for every two B.D.H. 5s ordinary, while preference holders are offered six Fisons 4½% cumulative preference £1 shares plus 5s for every five £1 5½% cumulative preference shares.

The bid is worth 27s 7½d against a closing price for B.D.H. on 2 February of 20s 6d. For the preference shares, the offer is worth 19s 10½d compared with the quoted price (2 February) of 18s for B.D.H. preference shares.

Ordinary holders of B.D.H. who accept will retain an interim dividend on account of 1959 which, in the event of the offer for the ordinary becoming unconditional the board of B.D.H. will be invited to declare at a rate not exceeding 12%. Preference shareholders will be entitled to the quarterly dividend payable on 31 March 1960.

Fisons intend to recommend 10% on ordinary for the year ending 30 June 1960—a 4% interim in May and 6% final in December.

If the offer becomes unconditional Fisons say that it is their intention that the business of B.D.H. should continue to be conducted under the B.D.H. board of directors, that the goodwill attached to the business should be maintained in every possible way, and that interests of staff and work people should be fully safeguarded.

Last published accounts of B.D.H. relate to 1958, a year in which their sales totalled nearly £7 million. Total sales by Fisons, in the year to 30 June last, were £46.7 million. Chairman of Fisons is Sir Clavering Fison, and Mr. G. C. R. Eley is chairman of B.D.H. (See also 'Distillates', p. 234.)

Ramsay Memorial Fellowships

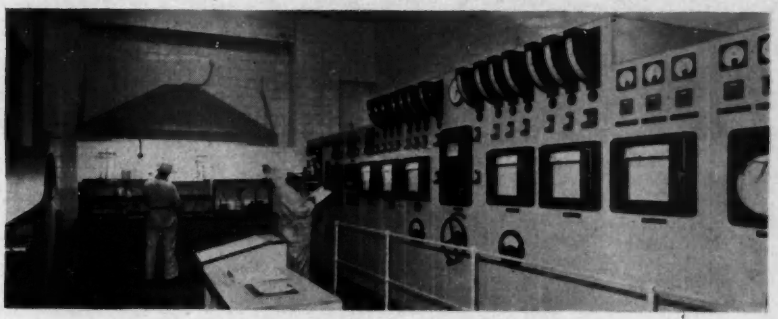
Applications for two Ramsay Memorial Fellowships for advanced students in chemistry will be considered next June. One of these will be limited to candidates educated in Glasgow.

Value of each will be £600 annually, to which may be added a grant for expenses of research not exceeding £100 a year. Further particulars from Ramsay Memorial Fellowship Trust, University College London, Gower Street, W.C.1.

Tetracycline Exempted from Import Duty

The Import Duties (Temporary Exemptions), No. 1, Order, 1960, provides that 6-norchlortetracycline hydrochloride shall be temporarily exempted from Import Duty until 1 October 1960. The Order S.I. 136-1960, came into operation on 3 February.

Project News



Control room at the new sulphuric acid plant

British Titan's New Sulphuric Acid Plant on Stream

A SULPHUR-burning contact sulphuric acid plant which brings British Titan Products Ltd.'s total capacity for this material both at Grimsby and Billingham to over 1,000 tons a day, has recently been commissioned by Chemical Construction (G.B.) Ltd. at the company's Billingham, County Durham, works. This latest addition is said to be one of the two largest in the U.K. and is the fifth such plant supplied by Chemical Construction to B.T.P.

The plant has a design capacity of 250 tons a day using sulphur as raw material, to produce sulphuric acid at 98% concentration. It has currently been producing acid at a rate of about 300 tons per day.

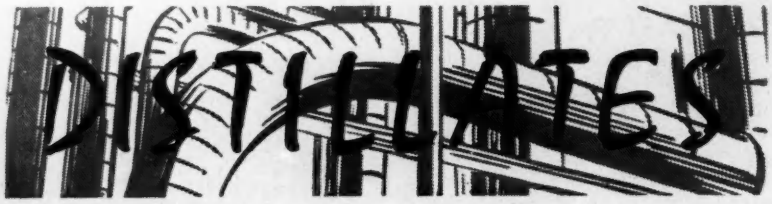
Of modern design the plant incorporates novel features. Sulphur is melted in steam-heated melting tanks and is pumped into the sulphur furnace via two Chemico spray burners each handling around 45 tons a day. The contact section uses a LaMont waste heat boiler for cooling the SO_2 gas and raising steam. The plant is equipped with a Chemico hot gas filter of novel design placed after the boiler and economiser. The filter is designed to enable a rapid change of the filter medium without an extended shut-down. It is estimated that a complete changeover may be made in under four hours while the plant is still hot. The blower room, pump room, and control room are all located under the tower structure. The control room is of particular interest. Great care has been taken in its design and aesthetic appearance, with its pale blue panel and white tile walls.

● S. D. PLANTS LTD., Bush House, London W.C.2, the wholly owned subsidiary of Scientific Design Co. Inc., New York, are participating with their parent company in the engineering procurement and construction phases of a number of chemical plant operating according to S.D.'s own licensed processes and which currently represent a cost to be installed in the U.K. of well over £3 million.

● WILLIAM BOBY LTD., Rickmansworth, Herts, have been awarded contracts valued at £16,000 for the dealkalisation/base exchange plants by George Wimpey and Co. Ltd., for Union Carbide Ltd.'s works at Hythe, Hants.

● IN 'Project News' of 21 January, p. 161, it was stated that Head Wrightson and Co. Ltd. had been awarded a contract for oxygen steel-making equipment for Consett Iron. This contract is worth £700,000 and not £70,000 as stated.

250 tons a day plant constructed at Billingham by Chemico



★ ONE of the most important post-war policy statements from a leader of the French chemical industry was given in New York on Thursday last week by Count Raoul de Vitry D'Avaucourt, chairman of Pechiney. The fact that his talk, given at a dinner held in his honour, attracted an audience of 550—the sponsors expected a turn out of 150—is a tribute to the increased interest that U.S. chemical producers are showing in developments and investments in Europe.

The Count dealt with the economic, technical and political aspects of the great expansion in his country's chemical industry. He gave figures illustrating the growth rate of production, spoke of the many new processes and patents which are being used throughout the world. He also spoke of the significance of the Lacq natural gas deposits, not only to the French economy but also to world sulphur supplies.

His remarks on the Common Market created most interest for he gave examples of how external tariffs, lower on many products for some C.M. countries, would benefit the world's chemical industries. He sees the Treaty of Rome as providing the same impetus to U.S. chemical firms as did the Ottawa Agreement in 1932. Then, U.S. companies entered the privileged zone by setting up plants in Canada and England, now they are doing the same in the C.M. area. He added that his own firm had become associated with U.S. partners in a European venture. (See report in p. 237.)

★ THE simultaneous failure of two small pieces of electrical equipment recently led to an almost complete power failure at I.C.I.'s Billingham works. Except for a few of the newer offices and research buildings, which take electricity from the grid, almost every plant, workshop and office building on both the north and south sites was without electricity and power for most of the afternoon.

I understand that despite the suddenness and completeness of the 'black-out' very little damage was done either to plant or equipment. Factory output in some parts was back to normal within a few hours of the full restoration of power and steam supplies. The rest had to gather momentum as their feed stocks became available again.

Loss of overall production was not as serious as it could have been due to a number of inter-related factors among them being the way in which plants were shut down quickly and efficiently when power was shut down and the way in which the start-up was handled subsequently. The biggest problem was at Cassel Works sodium plants where lack of power over an extended period could seriously damage plant and equipment. The situation was saved before any serious damage could take place.

★ THE call for the formation of a universal chemical manufacturers' association (free and independent of politics) which should have the authority to ban the use of chemical products, such as high strength peroxide, etc., for war-like purposes, which Mr. H. E. Alcock, of H. E. Alcock (Peroxide) Ltd., Luton, first issued in October 1957 was widely circularised throughout the world in 1957, 1958 and 1959.

Now Mr. Alcock tells me that he intends to follow up this drive in various other ways during 1960. His original statement, in English, French, German and Russian, was concerned at the erection of peroxide factories since the end of the war, all of which would "be aware of the war potential of the product".

Mr. Alcock has a background of more than 60 years in the chemical industry, of which 42 have been concerned with the development of Luton's chemical industry.

★ FOLLOWING the report that Soviet scientists of the Institute of Petrochemical (Oil Chemicals) Synthesis, had made organic semiconductors by irradiating polyacrylonitrile and polyacrylonitrile siloxane copolymers with ionising radiation (CHEMICAL AGE, 2 January, p. 18), I learn that the Soviet group plans to confine its studies. It is working from a theory advanced by Nobel Prize Winner Nikolai Semyonov who proposes that developing organic semiconductors is similar to developing artificial muscles.

Although the Russians claim that theirs is the first successful attempt at making polyacrylonitrile a semiconductor, researchers in the U.S. have noted similar effects on other polymers but not necessarily from irradiation. Bell Telephone Laboratories' workers have noted semiconductive properties with pyrolytic derivatives of polyvinyl benzene and polyvinylidene chloride. The Bell scientists have not found that semiconductivity in polymers is stable at least in their tests. Semiconductivity and oxidative stability have appeared to be competing and when one is good, the other is bad, and vice versa.

★ A FURTHER advance toward the establishment of international regulations for the safe transport of radioactive materials will be made by two expert panels' meetings of the International Atomic Energy Agency in Vienna in the first half of February.

The first panel, scheduled for 1-5 February, will deal with the transport of radioisotopes and radioactive ores and residues of low activity. The panel met for the first time in April of 1959 at which time draft regulations were formulated.

The other panel, meeting in the period 8-13 February, will formulate regulations concerning the transport of large radiation sources. This too is a second meeting of the panel and the two reports together will cover all safety aspects of the transport of radioactive materials.

★ PLASTICS turn up in the most improbable places! At least, so I thought on learning about I.C.I.'s part in preserving the hunting lodge said to have belonged to the Emperor Maximanius Herculius, which was built in the fourth century A.D. 70 miles from Catania, Italy.

Some 3,000 Perspex acrylic sheets to a special design have been supplied by the company's Italian selling agents, Maurizio Adreani K.C. of Milan, and are helping to preserve for posterity the magnificent mosaics and columns, the baths and gymnasium which have been found there. The extent of the detailed work involved is well illustrated by the fact that even the steel bolts in the framework used to support the roof have been protected by special Perspex caps.

★ CONGRATULATIONS to Fisons Ltd. on their bid for that stalwart of wholly British pharmaceutical industry—British Drug Houses Ltd. If their £7.4 million offer, cash cost of full acceptance of which will be less than £650,000, is accepted, Fisons will widen their interests in the pharmaceutical and medical field.

Fisons, famous for their fertilisers and pest control products, have interests in the pharmaceutical and medical fields through their companies, Bengers Ltd. and Genatosan. Bengers' main ethical specialities are Dextran, plasma substitute, Ferrivenin and Imferron, intravenous iron preparations for treatment of iron deficiency anaemias; those of Genatosan are Sanatogen, nerve tonic and dermatological preparations.

B.D.H. manufacture a wide range of pharmaceuticals including insulin, sex hormones, cortisone and allied steroids, vitamins, e.g. Multivite Radio-malt, Myanesin muscle relaxant, and liver preparations. In this last group is the world famous Anahaemin for the treatment of pernicious anaemia, vitamin B_{12} and Livogen. The company also manufactures a wide range of galenicals and B.P. preparations for chemists and at their Poole works have specialised in a wide range of laboratory chemicals.

Exports account for half of B.D.H. group sales and the company has subsidiaries in five Commonwealth countries (India, South Africa, Australia, New Zealand and Pakistan). Fisons' chemical and pharmaceutical interests although greatly extended since 1946 do not therefore overlap those of B.D.H. What is perhaps more important is that Fisons would be gaining an excellent research team headed by Dr. Frank Hartley.

Alembic

LURGI AND G.I. PROCESSES CRITICISED

N.C.B.'s Chief Scottish Scientist Says Neither Can Produce Really Cheap Gas

DISCUSSING coals for gasification in a paper presented to a joint meeting of the Scottish Junior Gas Associations held in Edinburgh, Dr. E. A. Chamberlain criticised both the Lurgi and gas integral (G.I.) gasification processes and commented on the Koppers-Totzek process.

Of the Lurgi process Dr. Chamberlain says "The popular belief that the Lurgi plant can produce synthesis gas from any grade of coal and that it can be used in conjunction with a Fischer Tropsch unit to produce valuable hydrocarbons from otherwise unusable low grade fuels is unfortunately not true. Indeed the choice of suitable coals for Lurgi operation is very narrow. Only non-coking, non-agglutinating coals can be used and the size grading 1 in. to ¼ in. must be carefully maintained especially in the avoidance of undersize. . . ."

Dr. Chamberlain states in his paper that while in theory coals of rank 900 and 800 should be suitable for Lurgi gasification, in practice not all these coals are completely non-agglutinating under high pressure conditions, and that it appears that the laboratory determination of rank does not give an entirely satisfactory answer as to whether a coal is suitable for the Lurgi process or not. He indicates that although the German Lurgi company have developed a laboratory carbonisation test in apparatus operating under 20 atms. of nitrogen or carbon dioxide, this test only resembles the Lurgi process in pressure at which it operates, for the large-scale process completely gasifies the coal in a stream of steam and oxygen, as against carbonisation to the semi-coke stage (550°C) in inert atmosphere in laboratory tests.

Experiments with similar test apparatus by the National Coal Board's Birmingham laboratory have shown, it is reported, that it does not give much more information than the normal laboratory method of determining rank. This has also been confirmed by the Gas Council's research department who have expressed the view that since the strength of the semi-coke was no longer of paramount importance, due to the introduction of stirrers in the Lurgi plant, the Lurgi assay was of little practical significance as it gave no indication of the quality of gas that was likely to be produced in a full-scale plant. Practical test only can decide the suitability of a coal for the Lurgi process.

Another point made by Dr. Chamberlain is that there has been no mention in the published literature on the Lurgi process of corrosion problems arising in a unit from sulphur, nitrogen, chlorine and phosphorus. It is assumed that these have not been overlooked and that any possible problems have been guarded against by the choice of suitable constructional materials. Of its gas producing, Dr. Chamberlain says that while it is claimed that the Lurgi process can produce gas with a calorific value of 500 B.t.u./cu. ft., "it is unlikely that a gas of calorific value of 400 B.t.u./cu. ft. would be produced at the normal operating pressure of 20 atmospheres". He estimates that to produce town's gas of 450 B.t.u./cu. ft., the operating pressure would have to be 30-35 atms. The technique of enrichment of the gas from 400 to 450 B.t.u. gives greater operational flexibility and, depending on the method of enrichment, greater economy than operation at the higher pressures required to give 450 B.t.u. But the lecturer points out, cost of enrichment must be an important factor in the economics of the Lurgi process since calculations indicate that approximately 5 cwt. of oil are required for every ton of coal gasified—and for Scottish Gas Board's Westfield plant when fully operational, annual oil consumption will be of the order of 100,000 tons.

Limited Trials

Trials with British coals in a Lurgi converter in West Germany have been limited to a few hundred tons, reports Dr. Chamberlain, and that there is no certain means of predicting the long-term problems that may arise in practice. "We must wait some years before we know sufficient about the Lurgi process to make a real assessment of its potentialities under local conditions."

The Gas Integral Complete Gasification Process. The G.I. process which is available in this country through Woodall-Duckham (see CHEMICAL AGE, 7 March 1959, p. 399) is a two-stage water-gas process, while the Lurgi is essentially a pressurised producer.

Integral gas, notes Dr. Chamberlain, has an advantage over water gas in that it has an initial calorific value higher by some 40 B.t.u. per cu. ft. and by fixing the tar vapours in the cracking chamber the full advantage of coal gasification is obtained, resulting in a gas of some 340 B.t.u. per cu. ft. Thus to obtain gas for distribution at 450 B.t.u. per cu. ft. the quantity of oil needed is considerably reduced when compared with a traditional carburetted water gas unit. In the G.I. the carburetting equipment performs three functions: fixing the tar in the raw gas; carburetting the gas with added oil; and fixing the vapours from the added oil.

The G.I. process requires closely graded coals of low swelling index, normally less than 3, so that choice is restricted to ranks 800 and 900, with the preferred sizes, 1½ in.-2 in. and 2 in.-3 in. Output falls with decreasing size of coal so that the maximum gas make with singles (½ in.-1 in.) is only 75% of the output with doubles or trebles.

Four advantages listed for the G.I. process and noted by Dr. Chamberlain are: it operates at near atmospheric pressure; it does not require oxygen; it can be used as a carburetted gas plant; and it can be built in multiple units, with a high degree of flexibility in operation. Main disadvantage of the process, states Dr. Chamberlain, is that it is not suitable for low-grade fuels and that it requires closely graded coal, which in the doubles and trebles sizes can be carbonised in traditional vertical retorts to give town's gas and a reactive smokeless fuel.

"It is apparent that in Great Britain neither the Lurgi nor the G.I. can produce really cheap gas from deep-mined coals." The reason for this, Dr. Chamberlain says, is that the cost of a graded coal must be of the same order as the coal used for normal carbonisation practice. "Only if low-grade fines can be gasified is it likely that an appreciable reduction in the cost of the gaseous therm can be achieved."

There is an urgent need, suggests Dr. Chamberlain, to develop gasification processes that can utilise minus 30 mesh coal, "only if this can be done successfully does it seem likely that cheap town gas can be produced or oil synthesis from coal become an economic possibility".

Cyclone Producer

Reference is made to the results obtained at the Fuel Research Station with the cyclone producer. Calorific value of the gas made from weakly caking coal has usually been within the range of 50-60 B.t.u. per cu. ft. and gasification efficiency has been restricted by the premature removal of carbon from the reaction zone by the gas.

Although there has been an apparent lack of success in developing pulverised fuel gasification processes in Great Britain since the war, Koppers in Germany claim that a successful design of pulverised coal gasifier is now commercially available. This is the Koppers-Totzek process which is said to be operating successfully in the U.S., France, Spain, Portugal, Belgium, Finland and Japan, while a plant is at present under construction in Greece.

According to reports, advantages of the Koppers-Totzek process are that it can utilise any quality of any rank coal, including the smallest fines, the limiting factor being moisture. Ash content and ash fusion temperature are stated to be unimportant. The plant operates at near atmospheric pressure and while oxygen consumption is some 50% greater than in a Lurgi plant, for the same production of CO and H_2, it is claimed that this is neither technically nor economically significant. Additional cost is more

The author states that the views expressed are his own and must in no way be taken to represent the official or unofficial views of the National Coal Board. He is chief scientist of the N.C.B., Scottish Division.

than offset by the savings in being able to operate at normal pressures as compared with the cost of operating a pressurised plant at high temperatures. A further advantage noted by Dr. Chamberlain is that this process produces no tarry or phenolic effluent. Calorific value of the gas, however, is 275 B.t.u. per cu. ft. and hence such a gas would not be a practical starting point for town's gas. It is a useful gas for synthesis purposes and it is suggested that it would be of interest to know what the economics would be of using part of the gas as a synthesis gas for providing an enriching gas for town gas purposes. Only a pioneering venture could provide the answers regarding the value of the Koppers-Totzek process.

Finally, Dr. Chamberlain says that it is perhaps unfortunate that the Koppers-Totzek process "should yet again be a foreign development and one is tempted to inquire why, like the Lurgi and G.I. process, we in Great Britain are forced to look abroad for solutions to our fuel utilisation problems".

C.J.B. Work on New Process for Total Gasification of Low-grade Fuels

NOW under development at Leatherhead by the Gasifier Division of Constructors John Brown Ltd., as part of Ministry of Power investigations into more efficient and economical means of producing gas from run-of-mine coal, is a pressurised coke gasifier. The fixed-bed continuous gasification system combines a high operating temperature with a high pressure. At present the gasifier is operating at pressures of up to 8 atm. absolute, although it is anticipated that in time gasifiers of this type will be capable of working at pressures of up to 31 atm.

In the gasifier, coke, which is used to avoid problems arising from the volatile constituents of coal, is reacted with a mixture of oxygen and superheated steam to produce 'synthesis gas,' a carbon monoxide/hydrogen mixture which is a suitable basis for the synthesis of hydrocarbon fuels.

It is expected that a production gasifier of this type would be able to generate synthesis gas at a substantially lower cost than is possible using current methods. When this ideal is realised, the gasifier's ability to convert all types of mined coal, with its low gas cost, will make it attractive as a means of supplying town gas and of making synthetic fuels and chemicals.

So far as town gas supply is concerned, the potential lowering of capital costs is an attractive possibility. The need for low pressure storage would be diminished, and the number and size of gas production units considerably reduced. The area occupied by such a gasification plant would be comparatively small, cutting land costs and reducing the extent of service installations.

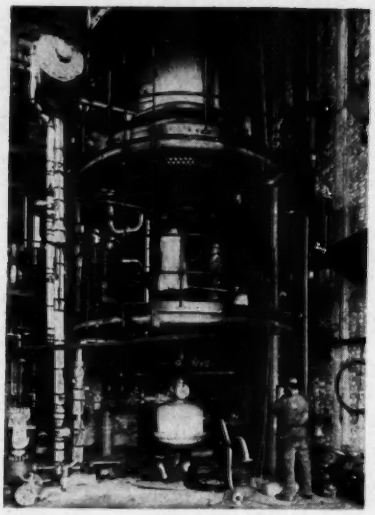
Coke is 'lock-hoppered' into the top of the gasifier, and the residual molten ash after gasification flows from the base of the vessel into a quench chamber within the pressure shell, at a temperature in the region of 1500°C. A major development problem has been the maintenance of a continuous flow of molten ash from the gasifier, and its removal from the pressure shell. After a number of trials, a hydraulic method has been devised which involves quenching the molten slag in a water bath inside the pressure shell; the resultant frit, suspended in the water, is discharged under its own pressure to a collecting hopper. Here the frit is retained and the water drains away to a re-circulation system.

A proportion of the frit, however, remains suspended in the recirculated water, which has to be re-introduced into the slag receiver against a pressure of about 100 p.s.i. Under these pressure conditions the suspended particles are exceptionally abrasive and it was therefore decided to install a Megator type GK3 pump set, supplied by Megator Pumps and Compressors Ltd., 43 Berkeley Square, London W.1, operating at a working pressure of about 130 p.s.i. and with a capacity of 5,000 g.p.h.

To provide cooling service, two Megator type K3 pumps have been installed as main and standby units. Injection of a make-up of cold water is accomplished by a set of three Megator M16 pumps each with a capacity of 900 g.p.h. Each draws cold water from the storage tanks and injects into the high pressure cooling system. Normally only two of these pumps are in operation, the third being brought into use under extreme conditions.

It is expected to be several years before a fully developed pressure gasifier of this type could be built, using run-of-mine low grade fuels, but it is possible that a gasifier using only coke as the fuel could be constructed somewhat earlier.

On extreme left are two Megator type K3 pumps, operating at 5,000 g.p.h., which circulate water at 100 p.s.i. through the main cooling system. Three pumps to the right are Megator M16's which inject cold water into the system to maintain its temperature



Experimental coke gasifier, which is being operated by C.J.B., seen being prepared for a trial run

Abbott To Move from Jarrow to Kent

MANUFACTURING operations of Abbott Laboratories Ltd., pharmaceutical manufacturers, are to be moved from Jarrow to the Isle of Sheppey in Kent. The move is to be made because the company needs about 120 acres for expansion and future developments and because the factory at Jarrow has a considerable effluent disposal problem.

Forty of the 200 employees have been invited to move with the company. Mr. M. N. Scorgie, managing director, hopes that the workforce will not leave the company 'high and dry' during the two-year period before production is switched to Kent. Those who stay until the final move takes place will qualify for compensation on a sliding scale up to 12 weeks' wages for seven years' service or more.

Copper Sulphate Production In the U.K.

Output of copper sulphate in the U.K. for the month of November 1959 totalled 2,303 long tons, bringing the total for the 11 months ending November to 700,764 long tons (722,843).

FRANCE'S RAPID EXPANSION IN CHEMICALS

Significance of Lacq Gas and C.M. Opportunities, by Pechiney Chairman

THE rapid post-war growth of the French chemical industry, the development of new processes and products, the significance to the French economy of the Lacq natural gas deposits and the Saharan hydrocarbons, and the great opportunities that the Common Market was opening up, not only to the C.M. countries but to the world's chemical industries, were the subject of a statesman-like address given last week in New York.

Under the title 'Recent advances of the French chemical industry,' Count R. de Vitry D'Avaucourt, chairman of Pechiney (Compagnie de Produits Chimiques et Electrometallurgiques), was speaking at a dinner given in his honour in the Waldorf-Astoria on 28 January by the American Section of the Société de Chime Industrielle. Mr. O. B. J. Fraser, section president, presided over an attendance of about 550.

He discussed the economic, technical and political aspects of the French chemical industry in the past 15 years. Dealing first with the economic questions, he said that France's chemical production index (basis 100 in 1952) was below 40 in 1945. By 1949 it had risen to 82, in 1955 to 150 and in 1959 was over 200.

In certain cases, development was even more spectacular. Chlorine production, for instance, totalled 47,000 tons in 1938; it was still only 66,000 in 1948, but reached 275,000 tons last year. For plastics the similar figures were: 10,000 tons in 1938, 39,000 tons in 1948 and 230,000 tons in 1959.

Financing Problems

That development had raised financing problems which were unknown on that scale to U.S. industry. In addition to the normal problems of chemical investments such as the intensity of capital spending, its high cost, great specialisation, and rapid obsolescence, France had had to face the overall problem of starting from almost scratch. Scarcity of capital, inflation, high interest rate, with the difficulty of self-financing due to price control, complicated the problem even more.

The French chemical industry, ranking third among the great industries of France, employed 230,000 workers, of which 14,000 were engineers and staff, and had an annual turnover of $3,000 million. The industry ranked second in the Common Market and sixth in the world. It was fourth among exporting countries, behind the U.S., West Germany, and Britain.

Annual growth rate of the French chemical industry had been between 10 and 14%, compared with 4 to 6% in the U.S. This rate of expansion was still advancing and from general estimates it appeared that in 1961 the overall level of chemical production in France would be 45% higher than in 1956. This growth rate varied from sector to sector, but was particularly spectacular in the field of organic chemistry.

Three original characteristics had had an effect on the recent advance of the French chemical industry. Firstly, it was highly spread out; the 10 leading enterprises accounted for 25% of all turnover, whereas in Germany, the three leading units accounted for 31%, while in Italy, one enterprise accounted for more than 50%.

Secondly there was the versatility of the companies. St. Gobain, although a chemical company, were also important glass producers; Pechiney and Ugine were chemical companies, but their electro-metallurgical production was considerable. Rhône-Poulenc were also large chemical producers, but they made pharmaceutical products as well.

Thirdly there was the creation of a very complex network of subsidiaries, which largely compensated for the disadvantages which such dispersal might otherwise entail.

Turning next to technical aspects, Count D'Avaucourt said that for some 15 years, the names of each of the large French chemical companies had been tied to one or more manufacturing processes, or to one or more new products for which patents had been used almost everywhere in the world.

New French Processes

Among new processes and products, he mentioned the Pechiney process for synthetic urea, the Frejacques patent, currently used by the Deere and W. R. Grace companies, Grace having recently doubled output. Pechiney had also perfected a continuous digestion process for the production of alumina, not to mention aluminium for which their processes were being used all over the world.

In the fibre field, the Comptoir des Textiles Artificiels produced Meryl, Rhône-Poulenc and their subsidiary, Rhodiaceta, had introduced Rhovyl while in the same field the Pechiney subsidiary, Organico, produced Rilsan. This nylon-11 merited special mention because of the originality of its manufacture and the wide variety of applications, with the importance of its by-products.

Office National de l'Azote had made themselves known by an original process for the treatment of gases with high methane content. Soc. Chimique de la Grande Paroisse were famed for a technique of cracking gaseous hydrocarbons for the preparation of synthetic gas and hydrogen. Air Liquide were working on the preparation of deuterium.

St. Gobain had built the first West European plant for separating plutonium from irradiated rods of the French nuclear reactors. In an entirely different field, they had made noteworthy progress in the polymerisation of vinyl chloride; their Chantereine glassworks were world famous.

In the pharmaceutical field, the Rhône-Poulenc laboratories had discovered a new antibiotic, while Uclaf-Roussel had successfully dealt with steroid hormones and the preparations of peptides.

After paying tribute to U.S. patents which were the bases of many important French plants, he thought that the most essential point, as far as technical progress was concerned, was the revolution which followed the discovery of the Lacq natural gas deposits. To that must be added the forthcoming exploitation of the Saharan hydrocarbons.

Abundant Materials

These developments would give French chemistry rich and abundant raw materials which had been seriously lacking. The very nature of the Lacq hydrocarbons raised technical problems which the industry had never faced before. Lacq gas was rich in hydrogen sulphide and this great concentration, with high temperatures and pressures, had considerably complicated the exploitation of the deposits. There was no steel capable both of resisting corrosion and of being used on a large scale for current purposes. That problem was now solved and the new steels that had been developed would doubtless find other applications in the chemical industry and elsewhere.

The high sulphuric content of the Lacq deposits would largely exceed French consumption needs. Production was scheduled to reach a daily total of 700 million cu. ft. of natural gas in one year; that would result in the production of 1,250,000 tons of sulphur. In 1956 France had imported 250,000 tons, plus 500,000 tons of pyrites. This production made France second only to the U.S. as a world sulphur producer.

Desulphuretted gas was a chemical raw material, for the utilisation of which an industrial complex had been created around the Acquitaine Chimie company, and its satellites Acetalacq, Methanolacq, Azolacq, Vinylacq and the associated Melle plant.

At the end of this year the plant would have a daily production of 75 to 100 tons of acetylene, 200 to 250 tons of ammonia and 100 tons of methanol. Part of these products, processed on the spot, would add to daily French production 70 to 80 tons of vinyl chloride, 100 tons of acetaldehyde, 30 to 50 tons of butanol, etc.

Branching out of Lacq would be an

entire network of pipelines to serve the vast regions of France, where the lack of power had until now hampered industrialisation.

One of the most important facts was that the Aquitaine Chimie complex was so large that it exceeded the capacity of any one of the leading French chemical companies. This complex was the result of collaboration among most French companies. The dispersal of French chemical enterprises was, therefore, not always a disadvantage.

Count D'Avaucourt next discussed political aspects of recent advances in the French chemical industry. Chemistry would be affected both by the creation of a vast new market and the intensification of competition.

Progressive creation of free competition in the Common Market provided a powerful incentive for all countries, because in most cases, and particularly in France and Italy, Customs duties which had now been transferred to the perimeter of the community, had also been lowered. That liberalisation with respect to outside countries, had accompanied the suppression of quotas, which had already begun to a large extent within the framework of G.A.T.T. and O.E.E.C.

C.M. Tariff Changes

He illustrated this change by giving a number of instances. Trichloroethylene was subject to a 25% import tax on entering France, 15% for Germany and 18% for Italy and Benelux. The C.M. tariff for third countries would be 19%, which represented practically no change for Italy and Benelux, a slight increase for Germany and a drop for France.

In the case of p.v.c., French duty was 30%, German 19% and Italian 25%. The C.M. external tariff would be 21%, a large decrease for Italy and France and almost no change for Germany. To cite a further example, alkali was taxed 30% when imported into France; the maximum C.M. duty would not be 15%.

This intensification of competition would seem to be leading to a two-fold trend. On the one hand, rationalisation measures within the Common Market would soon show their beneficial effect for the consumer and on the other, the entrance into the C.M. of foreign concerns, notably American.

Dealing with rationalisation, he pointed out that Pechiney, after absorbing two of their subsidiaries, had associated their chemical department with that of St. Gobain with the creation of a new joint company. Similar measures had been taken by different countries within the Common Market. He mentioned the case of Bayer, Progil and Ugine who had created a joint subsidiary, and Hoechst, B.A.S.F. and Nobel-Bozel. Already there was a long list of such undertakings.

"It seems to us," declared Count D'Avaucourt, "at least this is our interpretation, that for a U.S. firm, the Treaty of Rome has consequences which are very similar to those resulting from the 1932 Treaty of Ottawa which created Imperial Preference within the British Commonwealth; in both cases, it is a question of an area which is closing, or, in any event, which makes U.S. exports more difficult."

Just as after Ottawa many U.S. firms decided to enter the privileged zone by settling in Canada or in England, similarly, after the Treaty of Rome, a number had made the jump by setting up shop in Europe. Some went it alone, others chose the joint venture system.

He added: "I am personally gratified that my company has had the chance to participate in one of these joint ventures with very fine partners."

He concluded by saying that a great task faced Europe. Not only would it have to conceive and establish its own organisation, it would have to pursue and develop the mission incumbent on the more fortunate and more developed nations with respect to those at a less advanced stage.

That mission called for a large degree of understanding and generosity. The U.S., birthplace of the Marshall Plan, had provided a splendid example. For its part, France did not dream of abandoning the effort now being pursued in a large section of Africa.

That work must be the joint undertaking of all those possessing the means. On that work and the manner in which it would be carried out, largely depended the peace of the world. The spirit of liberalisation now in the air would facilitate that task. It would contribute to a climate of better mutual understanding. Multiplicity of exchanges, better understanding, those were the most decisive factors for prosperity and peace.

U.V. Absorber Protects Plastics Against High-energy Ultra-violet Radiation

NEW material for use in plastics and surface finishes to impart permanent protection against high-energy ultra-violet radiation will shortly be available from J. M. Steel and Co. Ltd., chemical merchants, 36 Kingsway, London W.C.2. The product will be known as U.V. Absorber 318. Supplied in the form of a coarse-grained yellowish powder, soluble in a range of solvents and plasticisers, it has good heat resistance to allow trouble-free incorporation in thermoplastics while they are being processed in injection moulding machines and extenders.

Compatability with most plastics is good and normal concentrations do not impair colour or clarity even of films and foils, nor does the material affect unfavourably the mechanical properties of high polymer materials. A particularly interesting characteristic is the stability of the product over the wide pH range of 1 to 12, and its indifference to iron salts and other heavy metal compounds, causing neither precipitation nor discoloration.

The product absorbs the most destructive ultra-violet light rays which lie outside the visible spectrum, i.e., below 3,900Å.

Much interest has already been shown in this product which naturally protects not only the plastics but also the article inside the plastics container, a point of particular interest to manufacturers of packaging materials. The main use, however, is likely to be in moulded articles made from high polymer substances to increase service life, maintain mechanical properties and combat yellowing where this is caused by u.v. radiation.

U.S. Titanium Equipment Passes 12-Month Test Period Under Severe Conditions

TITANIUM processing plant used in severe condition by Columbia-Southern Chemical at their Barberton, Ohio, plant has passed a 12-month test period.

Titanium and zirconium have been under test for about two years, these metals being used in all plant areas where corrosion has proved troublesome. Problems studied have been cost and problems arising from their use. In all some 2,300 specimens of 40 different metals and alloys under some 150 different chemical and natural environments have been or are under test.

Columbia-Southern engineers have investigated titanium and zirconium in key process points such as brine, acid and caustic flow lines. Previously obtained data has been substantiated and in some cases it is reported that the corrosion-resisting properties of these metals are so outstanding that it is suggested that more general use could be readily justified on a purely economic basis.

In 1958 Columbia-Southern put into service titanium equipment ranging from valves to tracer tubing at their Barberton plant and it has been found this equipment resists a wide spectrum of very corrosive environments. Thus a hairpin heating coil has been exposed to 62% calcium chloride at 310°F since April 1958 and has only one small pit. A 2-in. gate valve installed in September 1958 to handle 17% hypochlorous acid does not show any signs of corrosion and is still in operation. An atomiser wheel of a spray dryer installed in December 1956 and exposed to 18% hypochlorous acid has shown no visible signs of corrosion, and only parts failing due to erosion have been replaced. Also an interior lining of a chlorine cell top in use since June 1958 and in contact with 20% salt brine saturated with chlorine and wet chlorine gas at 190°C to 205°C has no visible corrosion. Zirconium equipment is still under test.

Prof. Chain Takes Biochemistry Chair at Imperial College

Wolfson Grant of £350,000 Accepted

THE Isaac Wolfson Foundation has offered a benefaction of £350,000 for the building and equipment of laboratories for biochemistry and chemical microbiology at the Imperial College of Science and Technology, and for the support of teaching and research, an offer which has been "gratefully accepted."

It is proposed to erect a new building, to be known as the Wolfson Laboratory, at the western end of the Royal College of Science building in Imperial Institute Road, South Kensington. The new department of biochemistry will also occupy some laboratories in the main Royal College of Science building which will become vacant in the summer of 1960 when the physics department moves to its new building in Prince Consort Road. The rest of the Royal College of Science building will be occupied by the department of chemistry.

Fermentation Units

The Wolfson Laboratory will include equipment and facilities not usually associated with departments of biochemistry, and in particular fermentation units of comparatively large size and workshops for advanced mechanical and electronic equipment. It will provide accommodation for training and research "in the neglected borderland between biochemistry and chemical engineering," and for research on an adequate scale on the biochemical production of chemicals of interest. This field is peculiarly well suited to the Imperial College with its strong schools of organic chemistry, chemical engineering and plant physiology.

Professor Ernst B. Chain, F.R.S., Nobel Laureate, of the Institute Superiore di Sanita, Rome, has been appointed to the Chair of Biochemistry at the College. The last professor of biochemistry there was Professor A. G. Chibnall, F.R.S., who succeded Sir Frederick Gowland Hopkins as professor of biochemistry at Cambridge during the war. Since that time biochemical work has been continued at Imperial College under the direction of a reader. In the appointment of Professor Chain the college has secured the services of one of the leading personalities in world biochemistry, and one who in Rome has been concerned with a development very similar to that now projected at South Kensington.

Professor Chain is celebrated for the part he played in the isolation of penicillin, the determination of its structure and the establishing of its curative properties. For this, in 1945, jointly with Sir Alexander Fleming and Sir Howard Florey he received the Nobel Prize for Medicine. Recently he has contributed to a further advance in this field as he has acted as adviser and consultant to a British group at the Beecham Research Laboratories who have isolated 6-aminopenicillanic acid, a key intermediate, which may well revolutionise the anti-

Professor Chain, who has been appointed Professor of Biochemistry at Imperial College

biotics field. His wife, herself a biochemist of distinction, has worked with him during his stay in Rome mainly on carbohydrate metabolism, and will join the research staff in the new department.

Belief is expressed that the new department of biochemistry at the college will attract research workers from many countries, and it is expected that support for its research work will be forthcoming both from Government sources and from those industries which are concerned with the productive applications of biochemistry.

Antibiotic Ledermycin Available in U.K.

THE new antibiotic, Ledermycin, produced by the Lederle Laboratories Division of Cyanamid of Great Britain Ltd., at their Gosport, Hants, plant, has been made available in the U.K. from 1 February. Chemically demethylchlortetracycline, Ledermycin is said to be significantly more potent than other tetracyclines and to be active against more bacterial strains.

Administered orally, it has been found to persist in the blood at an effective level over a longer period. This, plus increased potency, means that daily dosage recommended for an average adult with an infection of average severity is 600 mg. compared with 1,000 mg. of tetracycline.

Irga-solvent Process Speeds Wool Dyeing

THE Irga-solvent process for wool, developed by Geigy on the basis of an original idea of Dr. L. Peters and Dr. C. B. Stevens of Leeds University, is a method (patent pending) of dyeing wool from a bath containing a solvent using low temperatures and relatively short dyeing times. The temperatures are of the order of 60-80°C and the dyeing time about 30 minutes. The solvent used is benzyl alcohol.

The Irga-solvent process can also be used to apply acid dyes to nylon to obtain "shades which are faster to washing than those obtained with disperse dyes." It involves the use of benzyl alcohol as a dyeing assistant, together with anionic product, Irgasol NJ.

Chain's Work on Non-allergic Penicillin

ALTHOUGH a considerable number of biosynthetic penicillins have been obtained by adding different side-chain precursors to the culture medium, incorporation of aliphatic α, ω- dicarboxylic acids into the penicillin molecule has not until now been reported. Professor Chain, now at the Imperial College, and his former co-workers at the International Centre for Chemical Microbiology, Istituto Superiore di Sanità, Rome, Italy, have found that addition of the lower homologues of α, ω-dicarboxylic acid to a culture medium obtained using a strain of *Penicillin chrysogenum* gave a product that was active against *B. subtilis* and *Klebsiella pneumoniae*. On addition of adipic acid or the higher homologues the antibacterial activity against *K. pneumoniae* increased considerably while that against B. subtilis was slightly decreased (*Nature*, 1960, **185**, 97).

The penicillin formed after addition of adipic acid as side-chain precursor was isolated from larger quantities of culture media in purified form and found to be (4-carboxy-*n*-butyl)-penicillin, that is, to contain the adipic acid side chain. Identification was established by melting and mixed melting points as well as their paper chromatographic behaviour in two solvents (ethanol/conc, ammonia/water, 80:4:16, v./v./v. and *n*-butanol/acetic acid/water, 40:10:50, v./v./v.).

A comparison of the minimal growth-inhibiting concentrations of (4-carboxy-*n*-butyl)-penicillin and benzyl penicillin against a range of different Gram-positive and Gram-negative bacteria shows that (4-carboxy-*n*-butyl)-penicillin is very similar in its activity to cephalosporin N as reported by Heatley and Florey (*Brit. J. Pharmacol.*, 1953, **8**, 252), that is, it has a much lower activity than benzylpenicillin against Gram-positive and about the same order of activity against the *Gram*-negative bacteria.

Chain deduces that the lowering of the activity against Gram-positive bacteria is therefore not a specific effect of the α-amino group in the α-amino adipic side-chain, present in cephalosporin N, but can be obtained by the introduction of the simple adipic acid side chain or its higher homologues into the penicillin molecule, that is, by the presence of an extra free carboxylic group.

Skin tests of (4-carboxy-*n*-butyl)-penicillin in seven highly benzylpenicillin-allergic subjects have shown that the compound produces no allergic reactions.

In this report on this new penicillin, detailed information is provided on the method of culturing, extraction and purification of (4-carboxy-*n*-butyl)- penicillin.

New Features Prominent in C.A.'s 1960 Directory

THE only directory of its kind serving the British chemical industry, the *1960 Chemical Age Directory and Who's Who* contains many new features. This 300-page reference book is a complete guide to sources of supply in the chemical and allied industries and the chemical plant and laboratory equipment fields.

A 76-page Buyer's Guide is divided into two sections, the first dealing with chemicals and the second with chemical plant, laboratory apparatus, safety equipment, etc. Under 3,000 individual headings are listed nearly 10,000 suppliers of the items concerned. Headings for this section were completely revised during 1959 by a panel of chemical trade experts.

A comprehensive Master Index gives the names and addresses of more than 1,000 companies in the chemicals and allied fields. This part of the Directory also includes sections listing trade names with illustrations of trade marks.

Other sections list the names, addresses and telephone numbers of some 250 chemical and allied associations and societies, with their branches, both in the U.K. and overseas; the names and addresses of research stations of the Department of Scientific and Industrial Research, the Agricultural Research Council and the grant-aided research associations; and details relating to chemical departments and research of administrative organisations, such as Government departments, and State undertakings.

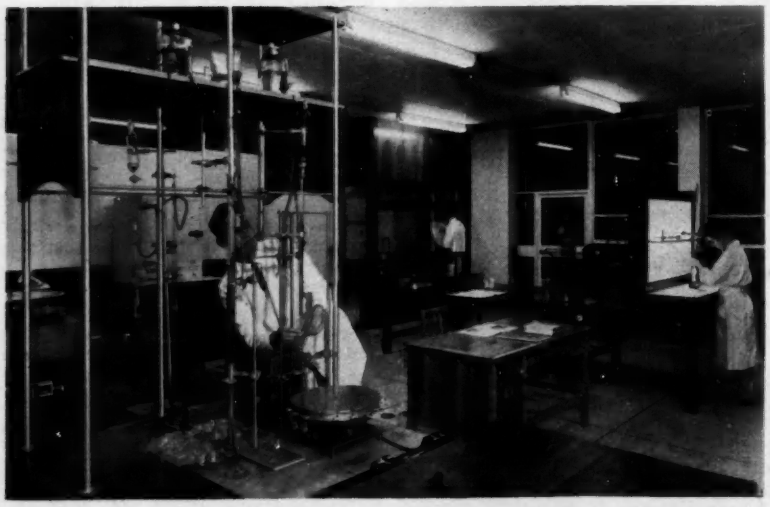
A new feature provides information on the higher educational facilities available in the U.K. universities and colleges of technology. This covers all the departments of chemistry and chemical engineering and gives the names and qualifications of the heads of each department with senior staff. The courses in chemistry and chemical engineering available at more than 200 technical colleges, with names and addresses, are also included.

A greatly expanded 'Who's Who of the Chemical Industry' (73 pages compared with 54 in the 1959 edition) lists biographical details of nearly 4,000 personalities holding senior positions in the chemical and chemical plant industries, industrial, academic and Government chemistry, chemical engineering, etc. Each entry includes qualifications, position held, name and address of the organisation concerned, Government appointments and offices held in associations or societies.

With a 1960 diary, the *Directory* has been mailed free to CHEMICAL AGE subscribers (annual subscription rate: U.K., 52s. 6d., overseas, 60s.); price for non-subscribers is £3 3s. per copy, from the Manager, CHEMICAL AGE, 154 Fleet Street, London E.C.4.

We regret that publication of the 'Directory' should have been delayed, but printing of it was unfortunately held up following the seven-week stoppage last year in the printing industry.

Sturge's New Birmingham Laboratory



Recently opened by John and E. Sturge Ltd. at Wheeleys Road, Birmingham, is this new two-storey laboratory, part of the firm's £100,000 research and development programme. (See 'Chemical Age,' 5 December, p. 830)

New Polymer Gives Stronger Paper

RECENTLY introduced by Cyanamid of Great Britain Ltd. is a new paper resin claimed to improve the dry-strength of paper. Accostrength Resin 2386 is a synthetic water-soluble polymer supplied as a free-flowing odourless powder, which can either be added to the stock or applied as a surface treatment. Quantities used are from 0.25% to 0.75% of the dry weight of the fibre, to give the following advantages, "superior dry-strength to virtually any paper; less operating cost through faster production; better sheet formation. There is no increase in the wet-strength, hence no broke problem and no apparent change in the bulk or porosity of the paper. The resin also provides greater stiffness and minimises the splitting tendency of heavy weight papers."

Training of Craftsmen for Chemical Industry

THE Association of Chemical and Allied Employers has set up an *ad hoc.* committee to prepare a scheme of practical training for engineering apprentices, together with model indentures and a series of practical tests for apprentice training.

The increasing importance of maintenance craftsmen in the chemical industry caused the association to encourage its members to introduce or extend craft apprentice training, states the first report of the Industrial Training Council, and some 450 boys are already in training in 46 chemical firms.

Drafts of the scheme drawn up by the above mentioned committee, the report goes on to state, have already been made available to member firms, some of whom are planning the introduction of craft apprentice training during 1960. The full scheme will be published later this year.

B.A.C. Liverpool to Stage Apparatus Exhibition

THE exhibition of scientific apparatus to be held by the Liverpool Section, British Association of Chemists, at the Donnan Chemistry Laboratories, Liverpool University, on 6 and 7 April will be opened by Professor C. E. H. Bawn, C.B.E., F.R.S., head of the Department of Inorganic and Physical Chemistry. Visitors will be able to inspect the professor's own research laboratories during the exhibition.

It is intended to make the exhibition the largest of its kind ever held on Merseyside. Exhibition organiser is Mr. H. L. Haigh, McKechnie Brothers Ltd., Ditton Road, Widnes, Lancs.

Chromatographic Apparatus for China

China has placed a further order to the value of £8,000 for six gas-liquid chromatographic analysis apparatus manufactured by Griffin and George Ltd., Alperton, Middlesex. This is the second large order to be received from China in 12 months, and will bring the number of these instruments now in use there to nine.

I.Chem.E. DINNER AT MANCHESTER

At the annual dinner-dance, l. to r., K. B. Ross (director of operations A.E.A. Industrial Group), Mrs. Ross, W. K. Hutchison (deputy chairman, Gas Council), I.Chem.E. president, Mrs. Morton and Professor Frank Morton (Manchester College of Science and Technology) and branch chairman, E. Woollatt (Lever Brothers), D. Hallett (Stainless Steel Plant Ltd.), Mrs. Hallett, H. T. Bone, consulting engineer, and A. H. Bryant (Stainless Steel Plant)

W. K. Hutchison Reviews Research and Development in Gas Industry

THE period of transition through which the gas industry was now passing, with the replacement of traditional methods, was likely to lead to high pressure processes with large installations sited at the coal fields or near oil refineries from which gas could be transmitted economically over long distances at high pressure to centres of consumption.

This was stated by Mr. W. K. Hutchison, deputy chairman of the Gas Council and president of the Institution of Chemical Engineers at the 15th annual meeting of the Institution's North-western Branch held in Manchester on 29 January. Professor Frank Morton, branch chairman presided at the meeting. For election of officers see 'People in the News.'

Mr. Hutchison, whose paper was entitled 'Research and development in the gas industry,' declared that the improvements in quality which the new processes made possible should foster the growing demand for fuel in a really convenient form for industry and the home. Referring to gasification he spoke of the Lurgi process developed in Germany to gasify brown coal with steam and oxygen at a pressure of 20 atm. and later adapted to use hard coal of low rank and finally demonstrated on a range of British coals.

Other systems under study were slagging gasifiers using oxygen and steam. These processes avoided a low efficiency of decomposition of steam by operating at a high temperature, above the melting point of the ash. Moreover in some of them there was a possibility of separating coal into sized pieces and fines and injecting the fines with steam and oxygen through tuyeres introduced near the bottom of a fixed bed, so that reaction would be completed within the bed. Other processes envisaged the use of a fluidised bed.

A recent development with carbonisation techniques was the Rochdale or carrier gas processes developed by the North Western Gas Board and investigated by Hodkinson, Nicklin and Redman. Heat transfer within a vertical retort was improved by injecting a carrier gas (blue water gas or coal gas) into the bottom of the retort and this had enabled the coal throughput to be doubled.

Annual Dinner. At the annual dinner-dance, Mr. W. K. Hutchison proposed the toast of the North-western branch. He declared that the Osborne Reynolds Medal had been awarded to Dr. A. Rees-Jones of Solihull who was the first hon. secretary of the branch and now hon. treasurer of the Midlands branch. Professor Frank Morton responded to the toast. Toast of the guests was proposed by Mr. H. E. Charlton, past-chairman, who declared that the gas industry would require a greater number of chemical engineers as it put more research into new processes. Dr. F. H. Kroch (Lankro Chemicals Ltd.) responded.

L. to r., Dr. J. S. Hunter (A.E.A.), vice-chairman, A. P. Buchanan, member of I.Chem.E. council, Mrs. Hunter, and R. J. Kingsley (Lankro Chemicals), branch hon. treasurer

Bakelite's Develop New P.V.C. Sheet

To meet the need for a p.v.c. sheet combining great toughness with excellent vacuum forming properties, Bakelite Ltd. have developed Vybrak DVR 262—a thermoplastic rigid sheet meeting these requirements. The material represents a new approach to the formulation of high impact strength p.v.c.-sheet in that it is produced entirely from p.v.c. copolymers. Small quantities of stabilisers, lubricant and pigment are incorporated, but no plasticisers, so that the use of modifiers which may lead to poor ageing characteristics is avoided.

Bakelite report that Vybrak DVR 262 has good dimensional stability and is capable of deep draw with good detail. It is suggested for use in applications such as refrigeration liners, trays, industrial containers, formed shapes, ioners, display, etc. The sheet is not recommended, however, for applications in which resistance to temperature in excess of 50°C (122°F) is required.

Rigid Vinyl Fume Extraction Plant

A fume extraction plant made from Cobex rigid vinyl produced by BX Plastics Ltd., has recently been installed in the Gillette works at Isleworth. Fabricated and installed by A. C. Plastic Industries Ltd., Long Street, London E.2, it is part of a new, fully automatic plating plant in use at the works; and has been employed because of the highly corrosion-resistant qualities of Cobex.

Developments in I.R. Spectroscopy Discussed at S.A.C. Meeting

'MICRO-GAS analysis' was the subject of a paper given by Dr. G. J. Minkoff, Chemical Division, B.P. Research Centre, Sunbury-on-Thames, at a recent meeting of the Midlands Section and Microchemistry Group, Society for Analytical Chemistry. Mr. C. Whalley, vice-chairman, Microchemistry Group presided.

Dr. Minkoff described the chemical and classical methods developed for the determination of small volumes of gases before dealing with the rapid growth in modern techniques, such as infra-red spectroscopy, mass spectroscopy and gas chromatography. Although in many cases it was not profitable to spend the large sums required, these newer methods were often available and it was as well to realise their potentialities.

Infra-red Spectroscopy. This was the subject of a meeting of the Scottish Section, S.A.C., held recently in Edinburgh under the chairmanship of Mr. A. N. Harrow, section chairman. In 'Applications of i.r. spectroscopy,' Dr. L. J. Bellamy (Ministry of Aviation, Explosives Research and Development Establishment, Waltham Abbey, Essex) reviewed recent applications in organic and biological chemistry. There was, he said, now a better understanding of the factors responsible for group frequency shifts and of the conditions under which they might be considered reliable. Intensive work and studies on solvent behaviour had also improved the method's utility.

Infra-red had also become a useful tool for stereochemical studies and for the investigation of steric hindrance or association effects. Studies in specialised fields such as the sterols or the chemistry of bacteria were opening up new fields in which i.r. spectroscopy was likely to give results of great biological importance.

At the same meeting, Dr. D. M. W. Anderson (Chemistry Department, Edinburgh University) declared that the 10^{-4} and 10^{-6} mole of vapours or liquids having low or medium boiling points could be determined to within $\pm 1\%$, using quantitative i.r. techniques. In his paper 'An application of G.L.C.-infra-red spectroscopy technique,' he showed apparatus developed for its application to the identification of G.L.C. fractions and to the investigation of sources of error in micro-analytical procedures. He discusses results obtained for the rapid simultaneous determination of mixed alkoxyl groups, e.g., methoxyl/ethoxyl, *n*-propyl/*iso*-propyl.

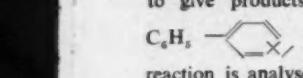
New Trends in Free Radical Chemistry

IN the chemistry of free radicals one interesting aspect is the arylation of aromatic compounds by a free radical mechanism. Suitable free aryl radicals may be generated either by the thermal decomposition at about room temperature of aromatic diazo compounds or by the slower thermal decomposition of dibenzoyl peroxide, which requires about three days at 80°C for completion. This latter process is preferred, reported Dr. Williams at a London Section, R.I.C., meeting held at the S.W. Essex Technical College, partly because it is a comparatively clean reaction which occurs without the formation of any tarry by-product.

Decomposition of dibenzoyl peroxide probably occurs mainly by the mechanism:-

$$(C_6H_5COO)_2 \rightarrow 2\,C_6H_5CO.O.$$
$$C_6H_5CO.O \rightarrow CO_2 + C_6H_5.$$

If this decomposition is allowed to take place in the presence of other aromatic compounds, then substitution of these compounds by phenyl radicals takes place to give products of the general type



The course of the reaction is analysed by determining both the partial rate factor in competitive substitution using benzene as a reference standard, and by the isomer ratio.

It has been found that most simply substituted benzenes except *tert.* butyl benzene react more readily than benzene with free aryl radicals and that polar substituents have comparatively little effect on the rate of substitution, in contrast to the effect of such substituents on the rate of both electrophilic and nucleophilic substitution. This is because the phenyl radical is not markedly either electrophilic or nucleophilic.

The general course of these reactions is supported qualitatively and approximately quantitatively, Dr. Williams indicated, by theoretical calculations based both on considerations of the free valence in the ground state at the possible sites of substitution and on considerations of atom localisation energy in the transition states.

Dr. Williams hopes that further progress will be made as a result of experimental work now being carried out to find a fresh source of aryl radicals suitable for this type of study. The most promising compound considered in recent work is triphenyl bismuth, which, when irradiated by ultra-violet light, decomposes to give phenyl radicals and bismuth.

New Format for R.I.C. 'Journal'

The Royal Institute of Chemistry has adopted a new format for its monthly *Journal*, with a larger type area measuring 9 in. by 7 in. The cover design in yellow and black provides the title at the foot of the page, over which appears the R.I.C. armorial bearings.

Dimethyl-Digol Gives Faster Organometallic Reactions, Raises Yields

DIMETHYL-DIGOL (diethylene-glycol dimethyl ether; diglyme) is said to be an excellent medium in which to conduct organometallic reactions, usually providing faster reaction rates and higher yields. Alkali metal borohydrides, particularly sodium borohydride, commonly used as a reagent for reducing ketones and aldehydes to the corresponding alcohols, are said to function more effectively on the addition of a polyvalent metal halide working in dimethyl-digol.

Compounds that may be reduced in this way, in addition to aldehydes and ketones, include esters, nitriles, disulphides, acids and acid anhydrides. In dimethyl-digol solution, diborane reduces aldehyde and ketone groups more easily than acid chloride groups. Dimethyl-digol is a new addition to the catalogue of the British Drug Houses Ltd. Laboratory Chemicals Division, Poole, Dorset.

Arsenaso, or 2-(*o*-arsono-phenyl-azo)-1:8 - dihydroxynaphthalene - 3:6 - disulphonic acid trisodium salt; Neo-thorone, can be used as a metal ion indicator for the determination of the following specific metals by EDTA titration: beryllium, aluminium, thorium, indium, zirconium and lanthanum.

Other new entries include iso-ascorbic acid sodium salt (sodium erythorbate; sodium D-arabo-ascorbate; sodium D-iso-ascorbate), for protecting natural or added ascorbic acid in foodstuffs against oxidation.

A new addition to the B.D.H. range of acid chlorides is 3-phenyl-propionyl chloride (hydrocinnamoyl chloride). It has been noted that working at 200-225°C and 140-400 mm. with platinum oxide as the catalyst, it hydrogenates to the aldehyde without by-product formation, which usually occurs under normal temperature and pressure.

Selenium disulphide, which has been used as a catalyst for converting olefins to ketones and as a stabiliser for polymerisable heterocyclic nitrogen compounds, has its main commercial use in special formulations for the treatment of dandruff.

Solochrome violet RS has been used in a polarographic determination of trace amounts of aluminium in cast-iron.

New R.I.C. Research Diploma Announced

A NEW research diploma for work on pure and applied chemistry has been established by the Royal Institute of Chemistry, to be awarded to graduate members, associates or fellows of the institute under conditions similar to those for the Ph.D. degree of a university.

It is expected that the possibility of obtaining the research diploma will be particularly attractive to those who are unable to satisfy requirements for taking a higher degree of a university but who may be able to undertake research under an approved supervisor in a technical college, an industrial firm, Government department or research association.

Analytical Review

X-Ray Fluorescence Spectrometry Gives High Accuracy

By
T. S. West, B.Sc., Ph.D., A.R.I.C.

X-RAY fluorescence spectrometry is usually applied to the analysis of solid samples of steels. Normally the technique can only be applied to samples having a uniform surface and finish; drillings and turnings are difficult to handle. Another difficulty which is sometimes met is the phenomenon of absorption enhancement. Mathematical treatment has recently minimised some of these problems, but such treatment is not always satisfactory.

Jones and Ashley (1) have reported a method which can be applied to the analysis of nickel, chromium and molybdenum in stainless steels using dissolved samples; niobium is determined on a solid phase sample after precipitation from solution. While the method is said to be faster than conventional wet-chemical procedures it is somewhat slower than the corresponding X-ray method which employs a solid sample. On the other hand this must be offset against the increased accuracy which is forthcoming. The standard deviation on all four analyses is better than ±1% of the amount present and the agreement between it and the corresponding analysis obtained by standard chemical methods is better than ±1%.

Sample Dissolved

An 0.5 g. sample is taken and dissolved in aqua regia, the nitric acid is fumed off with sulphuric acid and niobium is precipitated by sulphur dioxide treatment. After washing and ignition the niobium sample is obtained in a suitable form by pelleting with chromatographic-grade cellulose. The filtrate is concentrated and 10 ml. samples are used for nickel, chromium and molybdenum.

The niobium was analysed after operating the tube at 30 kvp. by intensity measurements at $2\theta = 21.35°$. The times for a minimum count of 2.56×10^6 for the niobium peak and 6.4×10^5 counts for background at $2\theta = 19.50°$ were recorded. The 10 ml. samples for the other elements were placed in cells provided with 2.5×10^{-4} inch Mylar windows.

For molybdenum, the tube was operated at 60 kvp. and measurements were made on the Kα line with a minimum of 1.28×10^5 counts. A molybdenum-free steel solution was used to correct for background radiation. Nickel and chromium were determined with the tube operating at 30 kvp. and 40 kvp. respectively and measurement on the corresponding Kα lines. A minimum of 1.28×10^5 counts was measured. The use of helium in the 'optical' path of the spectrograph yielded higher overall intensities and improved the peak-to-background ratios in dealing with chromium.

The method described by these workers was applied to 18% Cr—8% Ni stainless steels, but the procedure should be generally applicable to other stainless steels or alloys of iron, chromium and nickel. Apart from the advantage. of higher accuracy as compared with the solid sample method, the present procedure can be recommended on the grounds of being virtually free from adsorption-enhancement and of tolerating steel samples of any form or shape. Indeed, it might also be stressed that much smaller samples are required—as little as 0.1 g., if niobium is not requested.

Titration of Metals in Presence of Hydrolysable Salts. In a recent review in this series the application of thermometric titrimetry to the sequential titration of boric acid and sulphuric acid was described (2). This type of titration, in which the property being monitored during the reaction involves entropy as well as free energy terms, has now been shown to be capable of solving another unusual problem, *viz.* the titration of acids in the presence of hydrolysable salts (3).

The method was applied to the titration of hydrofluoric acid in zirconium solutions and sulphuric acid in uranyl solutions. The ΔH value for reaction (a) is —16.27 K.Cal/mole, while for (b) it is—4.86 K.Cal./mole.

(a) $NaOH + HF \rightleftharpoons NaF + H_2O$

(b) $2\ NaOH + ZrOF_2 \rightleftharpoons 2NaF + Zr(OH)_2$

Thus the curve obtained by plotting ΔH, i.e. response of a thermistor, as measured by a recording potentiometer/Wheatstone bridge, against titre of alkali added, shows the difference in response of the two reactions by a sharp change in slope when reaction (a) is replaced by (b). The method was checked by adding further known amounts of hydrofluoric acid to the zirconium solution. Uranium (IV) iron (II) and (III) and aluminium acted as additive interferences, since no change of slope could be observed when their hydrolyses occurred.

Titration of sulphuric acid in the presence of uranium produces a very sharp end-point. If copper is added a three-sloped curve is produced since the ΔH response of copper on hydrolysis differs noticeably from that of uranium (IV) and the neutralisation of sulphuric acid. Other determinations of this nature reported by Miller and Thomason are nitric acid in the presence of thorium, and free acid in chromium (III) sulphate solutions.

Semi-Quantitative Determination of 10^{-17} g. Amounts of Silver Iodide. Use of silver iodide to induce rain formation in the U.S. has raised the problem of determining particles of silver iodide in the submicron range. A recent paper from the meteorology department of Chicago University has shown how this may be done on a semi-quantitative basis by electron microscopy (4). The particles are deposited on a specimen screen and reduced by a reagent solution containing *p*-methylaminophenol sulphate, sodium sulphite, hydroquinone and sodium carbonate. This reduces the silver iodide particles to characteristic twisted and flattened crystals of silver metal.

Cross-section dimension of the silver iodide reaction product (*ca* 250 × 50 Å.) is the smallest among the halides and is consistent for a given combination of halide and reducing solution. This consistency forms the basis of the correlation between the original particle size and the length of the reaction product, and may therefore be used for the semi-quantitative determination of the silver iodide. The correlation curve, which is little removed from a straight line, is obtained by relating the length of the silver ribbon reduction products to the known diameter of the silver iodide particles which gave rise to them. Since this is a direct measure of the mass of the iodide particles, the ribbon products obtained by reduction of the nuclei in ice crystals can therefore be used to evaluate the original silver iodide which acted as the nucleus for the formation of the ice. The smallest particle which was detected by this method weighed 3×10^{-17} g.

Purification of Tetrabutylammonium Iodide for Polarography. Tetrabutylammonium iodide is most useful as a supporting electrolyte in polarography since it permits the attainment of a more negative potential than any of the other quaternary ammonium halides. Purification of such reagents is a problem which often troubles the polarographer. In this particular instance matters have been simplified by the recent publication of a purification method (5). The reagent is dissolved in 1 to 3 methanol in acetone, filtered and allowed to stand overnight with concomitant evaporation to half volume. About one-fifth the volume of distilled water is then added, and the tetrabutylammonium iodide which precipitates is filtered off, dried in a vacuum desiccator, and stored for use in a similar vessel. The nature of the impurities is unknown, but they cause serious discoloration with the liberation of iodine and the product thus used yields high residual currents.

Recrystallisation from ethyl acetate as recommended by Laitinen and Wawzonek (6) has been found to be tedious and inefficient; tetrahydrofuran as solvent yielded impure products and attempted chromatographic purification on a silica gel column failed similarly.

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U.K. Sulphuric Acid Output at Record Levels Last October

PRODUCTION and consumption of sulphuric acid (excluding Government stocks) in October 1959 were at the highest rates for the year, according to the December *Monthly Digest of Statistics*. Production totalled 215,900 tons compared with 195,700 tons in September and a 1958 monthly average of 186,800 tons. Consumption, including recovered acid, totalled 218,800 tons in October, compared with 210,400 tons in September and a 1958 monthly average of 189,000 tons.

Consumption and stocks of materials for acid production were as follows:

	Oct. 1959	Sept. 1959	Monthly Average 1958
	'000 tons		
	consumption		
Sulphur*	36.2	31.4	26.6
Pyrites	27.1	24.6	27.3
Spent oxide	19.9	18.2	20.2
Anhydrite	[65.8	54.2	62.4
	stocks		
Sulphur*	81.5	80.4	98.5
Pyrites	176.4	157.8	186.2
Spent oxide	90.7	91.8	97.5

* Inc. filter cake and boiler bottom

Petroleum. Deliveries of feedstock for U.K. petrochemical plants in November totalled 99,300 tons, compared with 100,900 tons in October, 57,800 tons in November 1958 and a 1958 monthly average of 69,300 tons.

Chemicals. Production of industrial ethyl alcohol in October totalled 3.73 million proof gall., compared with 3.84 million in September and a 1958 monthly average of 3.93 million. Production of penicillin averaged 4,191 mega-units in November, compared with an October weekly average of 4,271 and a 1958 weekly average of 3,661.

Rubber. U.K. consumption of synthetic rubber at a weekly average of 1,650 tons in October showed a decrease of 10 tons on the September figure and was 440 tons above the 1958 weekly average. Stocks of synthetic rubber, at a weekly average of 12,020 tons in October, were 400 tons up on the September figure and 410 tons below the 1958 weekly average. Production of carbon black, including lamp and vegetable black, but excluding acetylene and bone black, averaged 2,500 tons a week in October, compared with 2,200 tons in September and a 1958 weekly average of 2,100 tons.

Fuel and Power. Generation of electricity for the U.K. chemical industry (other than nuclear power stations), averaged 67.8 million kWh. a week in November, compared with 61.5 million in October and a 58.1 million weekly average in 1958. Coal consumption in the chemical and allied industries in November was at a weekly average of 120,000 tons (110,000 tons in October and 118,700 tons in 1958). The chemical and allied industries consumed 17,200 tons of oil a week in November (15,000 tons in October and 11,400 tons a week in 1958).

Big Increase in Sales of Nickel for Chemical Industry Applications

SALES of nickel for chemical applications, including that for catalysts, for 1959 showed a substantial increase over 1958. A new use for nickel appeared in the petroleum industry with one large company starting to market a premium lubricating oil for automobile engines which owes its superior performance to a nickel compound additive. This is stated by Dr. John F. Thompson, chairman of the International Nickel Co. of Canada Ltd.

Free-world consumption of nickel in 1959 exceeded 400 million lb., or about 25% over the 320 million lb. consumed in the previous year. The past year was marked by improved business conditions which were reflected in increased nickel demand and a renewed interest in the applications of nickel by industry. Intensified marketing activities and research produced gratifying results in the face of keen competition from other materials.

Free world capacity for nickel production in 1959 was at an annual rate of about 550 million lb. from all sources. This capacity, based on presently planned programmes, is expected to increase by more than 100 million lb. or 18% in the next two years. International Nickel's new mining project at Thompson, Manitoba, will contribute 75 million lb. to the annual increase in capacity.

Of the free world's present operating capacity for nickel production, Canada accounts for over 70%; Cuba 10%; U.S. 4%; and New Caledonia, Japan and other sources, the remainder.

U.S. stocks held under the Defence Production Act at 31 December totalled some 137 million lb.

With adequate supplies of nickel available, International Nickel in 1959 continued to intensify their marketing activities and market research throughout the world with the aim of creating and increasing markets or recovering those lost to other materials. A product development group has been formed to create, in conjunction with research staffs, new nickel-containing materials to satisfy the needs of new markets.

International Nickel have invented a new family of very high-strength 25% nickel alloy steels which can be produced in all the various commercial shapes such as bars, plates, sheet and tubing. The high order of mechanical properties and working characteristics attainable in these nickel alloy steels are expected to make them of particular interest for pressure vessels and many other industrial and defence uses.

Record U.K. Output of Man-Made Fibres

OUTPUT of man-made fibres in 1959 achieved a new record, the British Man-Made Fibres Federation reports. Production totalled 514 million lb. against only 422 million lb. in the previous year and the former peak of 495 million in 1957.

Records were established for both continuous filament yarn and staple fibre, the filament total at 235 million lb. comparing with 191 million lb. in 1958, and exceeding the previous record year, 1955, when the total was 233 million lb. Growth in production of staple, however, was the main influence in the record figure in 1959, which saw staple at 279 million lb. compared with 231 million lb. in 1958 and 263 million lb. in 1957, the previous record.

The Federation records that although full production of the newer synthetic fibres has been an influence, it is clear that the biggest factor in the record year has been the large expansion in production of rayon staple, which is known to have accounted for nearly half of the output of man-made fibres of all types.

British Plastics Output at Record Level in 1959

EXACT details of output of the British plastics industry are not yet known but a record figure approaching 500,000 tons is forecast by the British Plastics Federation. This will represent a rise of about 80,000 tons over 1958, when output was 415,600 tons, and is the biggest for some years. Production increased by 90,000 tons to 274,000 tons in 1954; it has also more than trebled in ten years; in 1950 it was 155,000 tons.

Exports of raw materials were valued at nearly £40 million, an increase of over £7.8 million over 1958. The volume, over 157,000 tons (123,000 tons) was also a record. Both value and volume are approximately double the rates of six years ago—1954, 73,000 tons valued at £20 million.

Biggest buyer in 1959, as for several years past, was Australia (£4.2 m.) and exports to Hong Kong rose from below £1 m. to over £2.6 m.

Other substantial markets were: Sweden, over £2 m.; the Netherlands and France, both over £1.8 m.; South Africa, nearly £1.6 m.; Belgium, Italy, New Zealand and Denmark, between £1.4 and £1.5 m.; West Germany, £1.3 m.; Norway, nearly £1.3 m. and India, over £1.1 m.

Consumption of TEL Increases in U.K.

Consumption of lead in the U.K. by the undermentioned trades was somewhat increased during 1959. In the manufacture of battery oxides during the month of November 2,882 long tons were consumed, making a total for the 11 months ending November of 24,997 long tons (24,286). Commensurate figures for tetraethyl lead are 2,224; 21,375 (18,178): those for 'Other oxides and compounds' are 2,405; 24,762 (23,631): for white lead 792; 7,563 (8,278).

Overseas News

ALTONA'S CARBON BLACK PLANT USES FURNACE METHOD WITH HEAVY OIL

ANNUAL production of carbon black at the £2 million, 37-acre plant of Australian Carbon Black Pty. Ltd., will be about 25 million lb.—nearly 75% of Australia's needs, and providing an annual saving of more than £1 million in foreign exchange.

This plant was built by Australians faster than any other Cabot overseas plant. More than 95% of the components for the project were Australian made with certain essential equipment being imported from the U.S. Plant design and construction was by Cabot Engineering.

Of the three processes for making carbon black, the Altona plant uses the furnace method as the other two require natural gases which are not available in Australia. Raw material in the furnace method is heavy oil from the heavier fractions of oil refining. This oil is 'cracked' at high temperatures in the specially designed enclosed furnaces. The black-laden gases are then cooled to 500°F and the carbon is separated from the gas by cyclone separators and a series of fibre-glass filter bag compartments, After separation, the carbon is processed to increase its density and change to pellet form.

Australian Carbon Black's Altona plant was officially opened last October. The company headed by O. G. Meyer, managing director, is backed by Godfrey L. Cabot Inc., Boston, U.S., and the United Carbon Co. of West Virginia.

Amoco Defer Polystyrene Plant

In view of recent developments Amoco announce that they are deferring construction of the polystyrene plant which they were to build at Joliet, Illinois, to produce high-impact and conventional polystyrene. On a large-scale basis the company is going ahead, however, with construction of a semi-works plant for making polystyrene. This unit, to be sited at Joliet, will be completed in March.

U.S. to produce New Synthetic Rubbers

Plans are being operated to put into commercial production two new synthetic rubbers, Ameripol SN (polyisprene) and Ameripol CB (cis-poly-butadiene), according to Goodrich-Gulf Chemical.

New Montecatini Plant for Paint Industry Products

In the presence of the Italian Minister for Industry, the foundation stone was recently laid for a new Montecatini plant at Mirandola, near Codogno. The plant will be concentrated on the paint and lacquer industry, and with an annual consumption of 37,500 tonnes of pigments, 52,500 tonnes of solvents and 60,000 tonnes of binding agents will produce about 150,000 tonnes of paints and lacquers a year. Also to be produced are hydrocarbon derivative products for the textile, leather, paper, wood and building industries, of which quantities will be exported to both European and non-European countries. Montecatini are to make the Mirandola site the home of a large research institute.

Persia Seeks Activated Carbon

The State-owned Iranian Sugar Factories Corporation, Avenue Shah, Teheran, Persia, has asked for tenders by 23 February for 150 tons of activated carbon.

Polythene Resin Production at Ragusa

During the early months of the current year, ABCD, a company belonging to Bombrini-Parodi-Delfino-Cementi Segni Group, will start, at their plant at Ragusa, Sicily, production of Riblene, a new polythene resin. Initial output has been scheduled at 12,000 to 13,000 tons a year.

The process to be used is based on olefinic cracking of crude oil yielded by the local oilfield and the new product will be turned out in several types suitable for particular applications.

W. R. Grace's Interests in Caribe Nitrogen Corporation

Caribe Nitrogen Corporation is the new name of Gonzalez Chemical Industries Inc. who operate a plant in Guanica, Puerto Rico, producing ammonia, sulphuric acid and ammonium sulphate.

Under a management contract, since October 1959, W.R. Grace and Co., New York, U.S., have been operating Gonzalez Chemical Industries. Now, under a reorganisation of the Puerto Rican Co., Grace Internacional S.A., a subsidiary of W. R. Grace and Co., have acquired a substantial stock interest in Caribe Nitrogen.

Urea Plant for Korea

A urea plant with an annual production capacity of 82,000 tonnes is reported to be under construction in the Republic of South Korea. Concerned in the building of the plant are West German construction firms.

Petro-Tex Chemical's Work on Polybutylene

Intensive pilot plant studies on polybutylene have been under way by Petro-Tex Chemical, Houston, U.S., who are now reported as getting ready to market this polyolefin. Last June Montecatini announced that they had brought polybutylene to the pilot plant stage, and U.S. companies, Hercules Powder, Spencer Chemical and Goodrich-Gulf have announced that they have been investigating this polymer.

Reports on polybutylene to date indicate that this polyolefin would have a wide use for heavy-duty applications such as in plastics pipe and packaging films. Polybutylene film as prepared by Petro-Tex is reported to have almost twice the impact resistance and tear strength of polythene.

A further attraction of polybutylene is cost. Petro-Tex's plant studies have shown that the cost of polybutylene should be about the same as polythene; also that in some instances, as greater amounts of filler such as carbon black can be used without loss of tensile properties, polybutylene would be the cheaper product.

Revolutionary Battery Development in Holland

Professor of physical chemistry at the Amsterdam Municipal University, Professor J. Ketelaar, claims that an electromotor fed by a revolutionary battery on which he is working may well replace the present petrol engine in cars within the next 25 years. He says that his own progress in this study is based upon pioneer work done by Russian scientists, in particular Davtyan's work.

Power yield of these special batteries, he says, is double that of normal electricity production. The fuel element is fed by ordinary coal gas and air. When carbon monoxide is burnt to produce carbonic acid gas, Ketelaar says, not heat but direct energy, electricity, is produced.

The battery is expected to produce a fuel saving of 50%, and the electro-motor itself is said to be very simple in comparison to the complexity of the petrol engine.

Caesium Cell Converts Heat Direct to Current

Conversion of heat directly into alternating current is claimed to have been accomplished by Dr. Robert W. Pidd of General Dynamics' General Atomic Division. Using a caesium cell significant amounts of 100 kilocycle current has been produced, and it is suggested that production of 60 cycle current should not be difficult.

Pidd's discovery opens a new route for conversion of heat to electricity. At this stage of the experiments no idea of cost is known or whether it will be economically preferable to convert heat to direct current, followed by conversion of this to alternating current.

Oil-resistant Tank Linings for Uranium Reduction Plant

Rapid deterioration of previous tank lining materials has led operators of uranium reduction plants in South Africa to adopt neoprene. Problems at these plants have included the attack by oil on lining materials used in the clarifying tanks, and excessive wear through abrasion. These have resulted in rapid impairment of other lining materials used in the past. Neoprene-lined tanks, manufactured and applied by Dunlop Industrial Products (Pty.), are located at the Presi-

dent Steyn Gold Mining Co. Ltd., and the Welkom Gold Mining Co. Ltd.

The tanks are 8 ft. high and 50 ft. in diameter. They are used to clarify the pregnant solution from the solids, consisting mainly of siliceous matter. The pregnant solution then goes directly to the ion exchange columns from which the uranium oxide U-238 is extracted. To make the lining 3/16 in. thick, sheet neoprene is bonded to 1/32 in. thick natural rubber. These are precured. The natural rubber backing is then coated with cement and covered with glazed linen. After the precured lining material is transported to the tank sites, the linen is stripped off exposing the cement-coated backing. The cement-coated natural rubber backing is then affixed to the tank.

Desulphurising Naphthalene by Pressure Hydrogenation

To desulphurise naphthalene a pressure hydrogenation process will be used in a Koppers plant instead of conventional processes such as sodium refining. A plant, scheduled to be completed later this year is to be built by Koppers at Follanshee, West Virginia. It will have a capacity of 60 million lb./year of sulphur-free naphthalene.

American Cyanamid will be the plant's major customers. They will use the naphthalene to make phthalic anhydride by fluid bed process at Bridgeville, Pasadena.

U.S. Chemical Exports and Imports Higher in 1959

Provisional figures set U.S. chemical exports for last year at nearly $1,500 million, or some 10% higher than in 1958. Imports of chemicals and chemical products rose by 35% (as against a general import increase of 22%) to reach a total 1959 value of about $360 million.

Canadian Tariff Board on Chemicals

A new list of tariff items, additional to those published in 1957, has been issued by the Canadian Tariff Board to be considered under Reference No. 20 on Chemicals. The date 29 February 1960 is specified by which time interested parties must file with the Board, 70-74 Elgin Street, Ottawa, any proposals which they wish to make relating to the division of the groups of tariff items.

The *Board of Trade Journal* dated 22 January carries full details of the public hearings on the chemical industry scheduled to start on 2 May 1960; and it is understood that further hearings will probably begin in September.

Polythene Expansions by Dow and Allied Chemicals

More polythene expansions are under way in the U.S., this time by Dow and Allied Chemical. Dow are reported to be increasing polythene capacity by about 67% at their Freeport, Texas, plant. This expansion, due to be completed in 1961 will increase Dow's polythene capacity at Freeport to an estimated 165 million lb. a year.

Allied chemical are going ahead with their polyolefins complex at Orange, Texas. When completed, capacity will be about 50 million lb. First stage in the building of this plant will be facilities to make linear polythene for pipe applications. Later stages will include units to produce more polythene and also polypropylene.

U.S. and French Concerns to make *p*-Xylene in France

Oronite Chemical and Societé Californie-Atlanitque, a new French company now being formed by Antan Petroles del Atlantique and Societé Progil, are to produce *p*-xylene in France in a multi-million dollar plant at Douges, on the Loire River, near St. Nazaire. Societé Californie-Atlantique will build and operate the plant which is expected to be completed by the end of this year.

Main outlet for the French-made *p*-xylene will be synthetic fibres with Rhodiaceta, France's largest fibre producer the biggest customer.

Polymer Corp.'s Expansion Plans

Plans to spend $6.1 million on expanding their facilities this year are announced by Polymer Corporation, Canada's State-owned producer of synthetic rubber at Sarnia, Ontario. The funds required will be provided out of the corporation's earnings.

Of the total, $4.7 million is for improvement of production units, further work on solution polymers and special types of rubbers, air and water pollution prevention and expansion of employee facilities. The remainder is for completion of projects started last year.

The corporation expects to operate at maximum capacity this year.

Swedish Manufacture of Chloroethylene

Output of the new plant of Uddenholms AB., at Skoghall, Sweden, will comprise both high purity trichlorethylene and perchlorethylene in sufficient quantity to satisfy all the country's requirements and make a substantial export possible.

Consolidated Zinc Plant in Australia

Contract for construction of a blast furnace and ancillary equipment for an Imperial Zinc type smelter has been awarded to Woodall-Duckham (Australasia) Pty., a member of the Woodall-Duckham group.

This is a part of Consolidated Zinc's £8 million expansion scheme at Cockle Creek, New South Wales, and involves plant which in addition to zinc smelting can simultaneously produce lead metal.

Israeli Ammonium Sulphate

According to a Barclay's Bank report, a new plant for the production of ammonium sulphate is to be built in Israel. The output of the installation is aimed at meeting the 2,000 tons/year increase in consumption of this chemical in the country.

Commercial Success of Stauffer's Petrochemical Carbon Disulphide Process

FOLLOWING the success of the petrochemical carbon disulphide process at their Le Moyne, Alabama, plant, Stauffer Chemical are building a second plant at Delaware City, Delaware, U.S. Capacity for this new plant has not been announced. Scheduled on-stream date is November 1960.

So successful has the new process proved that Stauffer are considering shutting down some of their older plants that use the charcoal-sulphur process. Developed by Pure Oil Co., the petrochemical CS_2 process utilises a vapour-phase reaction of sulphur and methane over a silica gel catalyst. Other U.S. companies using the process are Columbia-Southern, at South Charleston, West Virginia, and a plant also at South Charleston jointly owned by Westvaco and Allied Chemical.

In the process purified methane at about 60 p.s.i. and liquid sulphur in about stoichiometric proportions pass through a furnace where the sulphur vapourises and mixes with the methane at about 1,200°F. Preheated vapour passes to the reactor where over the silica gel catalyst, the reaction $CH_4 + 2S_2 \rightarrow CS_2 + H_2S$ takes place. Conversion is stated to be about 90 to 95%.

Vapour stream from the reaction containing CS_2, H_2S and unreacted sulphur passes to a condenser where suphur condenses and is recycled. The gas stream (temperature 100°F) still contains some sulphur. It is passed to a scrubber where sulphur condenses against CS_2. After partial condensation of CS_2 from the scrubber effluent, the gas stream goes to an absorption tower where remaining CS_2 is absorbed in a light oil solvent. Off-gas from the absorber, containing 90 to 95% hydrogen sulphide, passes to a sulphur recovery unit where H_2S is oxidised back to elemental sulphur for recycling.

Oil containing CS_2 flows to a stripping column where steam distils out the carbon disulphide. Overhead CS_2 passes to a distillation column where remaining traces of H_2S are removed. Bottoms from this column is pumped to a final distillation stage where heavy ends drop out. Overhead from this column condenses and is washed with caustic soda to remove any sulphide traces.

Because of the low ignition temperature of CS_2 (230°F) much care has to be taken both during manufacture and storage. To avoid contact with air, CS_2 is stored under a blanket of water. The storage tanks are submerged in water to eliminate any danger from possible leaks.

Output from Stauffer's new facility is destined for the production of Cellophane, rayon and chemical intermediates.

PEOPLE in the news

● **Sir Walter Worboys,** formerly commercial director of I.C.I., has been elected to the board and appointed a deputy chairman of BTR Industries Ltd.

● **Mr. C. D. Cook** has resigned his recent appointment as a director of Hickson's Timber Impregnation Co. (G.B.) but remains with the company as research and development manager.

● **Mr. J. Donald Barr** is retiring as joint managing director of the I.C.I. Paints Division at the end of this month on medical grounds. Mr. Barr, who was educated at Glasgow University, joined the paint side of I.C.I. as a technical representative in 1932. He joined the division board in 1943. In 1949 he became sales director (home and overseas) and was appointed joint managing director in 1955.

● **Wing Commander J. C. Cantrill** has been co-opted a director of Cellon Ltd. He has been with the company for 30 years.

● **Mr. E. Capstick, O.B.E., M.C., M.Sc.,** is to succeed **Professor A. N. Duckham, C.B.E., M.A.,** as chairman of the Milk and Milk Products Technical Advisory Committee. Mr. Capstick is a director of Unigate Ltd. and is responsible for the firm's scientific investigations. He was professor of dairying at Reading University from 1938 to 1946.

Dr. E. R. S. Winter, joint managing director responsible for research and development for John and E. Sturge, whose new laboratories are shown in p. 240

● **Professor Frank Morton, Ph.D., D.Sc., F.R.I.C.,** Professor of Chemical Engineering at Manchester College of Science and Technology, was re-elected chairman of the North-western branch, Institution of Chemical Engineers, at the annual meeting held in Manchester on 29 January. **Dr. J. S. Hunter** (Atomic Energy Authority) succeeded **Mr. H. E. Charlton** as vice-chairman and **Mr. R. J. Kingsley** (Lankro Chemicals Ltd.) was appointed hon. treasurer. Mr. Kingsley is succeeded as hon. secretary by **Mr. A. V. Bailey** (Hardman and Holden Ltd.). Elected to the committee were: **I. R. McDougall** (Leeds University), **M. Shaw** (Project Constructors Ltd.), and **B. F. Street** (Petrochemicals Ltd.).

● **Mr. Percy H. Roberts,** an employee of Hickson and Welch Ltd., has been elected as the next mayor of Castleford borough.

● The following executive directors have been appointed to the board of Simmonds Aerocessories Ltd.: **Mr. A. Beard,** formerly executive director and chief production engineer; **Mr. W. J. Burnell,** formerly executive director and chief mechanical engineer; **Mr. S. H. Goss,** formerly executive director and general sales manager; **Mr. A. P. H. Pehrson,** formerly executive director and export manager; **Mr. C. J. Williams,** formerly executive director and works manager; Mr. Goss and Mr. Williams are also appointed assistant managing directors.

● **Mr. S. S. Carlisle, M.Sc., A.M.I.E.E.,** head of the physics department of the British Iron and Steel Research Association, has been appointed an assistant director.

● **Mr. Bryan Richardson,** a district adviser with the National Agricultural Advisory Service, has been appointed technical adviser to the Eaglescliffe Chemical Co. Ltd., Stockton-on-Tees.

● **Sir John Wrightson, Bt.,** vice-chairman for the last 10 years of Head Wrightson and Co. Ltd., has been appointed to succeed **Mr. Richard Miles,** chairman and managing director, who retired on 31 January. Mr. Miles had been chairman of the company for 10 years, and managing director for 25 years.

Lt.-Cdr. Stokes

Sir J. Wrightson

● **Lt.-Comdr. J. A. L. Stokes** has been appointed group sales manager (home) for Elga Products Ltd. He has been manager of the company's Ion Exchange Division since its inception early in 1956.

● **Mr. J. Moffat** has been appointed general manager of the newly formed refineries department of British Petroleum Co. Ltd. (see page 250). **Mr. D. W. K. Barker** and **Dr. T. Tait** are appointed assistant managers of the same department. **Mr. P. Docksey** becomes general manager of the company's research and technical development department. **Mr. R. C. Thomas** and **Mr. W. Pratt** become respectively general manager and assistant manager of the engineering division.

● **Sir Alexander Todd,** Professor of Organic Chemistry at Cambridge, will be awarded the honorary degree of Doctor of Science at Exeter University on 4 May.

● **Dr. J. F. Richardson,** senior chemical engineer of A. Boake, Roberts and Co. Ltd. since October 1958, has been appointed professor of chemical engineering at Swansea University College in succession to Professor E. S. Sellers.

● **Mr. R. E. F. Sykes, A.M.I.W.M.,** has been appointed general manager of Griffin and George (Laboratory Construction) Ltd., a subsidiary of the Griffin and George Group, Ealing Road, Alperton, Wembley, Middlesex. Mr. Sykes succeeds **Mr. A. E. Lambert,** who has retired from the company.

R. E. F. Sykes

● **Mr. Gilbert Innes,** who did not wish to continue in office, was not re-elected chairman of the Chemical and Allied Trades' Section, Manchester Chamber of Commerce, as stated in CHEMICAL AGE, 16 January, p. 133. **Mr. E. D. Carey,** who on 31 January took over a new appointment as Northern area manager for Imperial Chemical Industries Ltd., has been elected as chairman of the section for 1960. Before assuming his new position Mr. Carey was managing director of the I.C.I. Pharmaceuticals Division, of which he is remaining a director.

● **Mr. R. D. Cribb** has been appointed sales manager of Solway Chemicals Ltd., a subsidiary of Marchon Products Ltd. (one of the Albright and Wilson group of companies). **Mr. B. Milling** has been appointed sales research officer of Solway Chemicals, to promote Marchon's surfactants and chemical auxiliaries.

● **Dr. J. W. Clark-Lewis,** senior lecturer in organic chemistry, Adelaide University, has been awarded a Royal Society bursary under the Nuffield Foundation commonwealth scheme to continue study of the chemistry of natural products, with particular reference to the stereochemistry of flavan derivatives, at Imperial College, London, for seven months from October 1960. The following have also been named for the awards: **Dr. L. M. Jackman,** lecturer in organic chemistry, Imperial College, London, to investigate hydrogen bonding in organic molecules by nuclear magnetic resonance

spectroscopy, at Adelaide, from July to October 1960: **Professor D. O. Jordan,** Angas professor of physical and inorganic chemistry, Adelaide University, to assist him to visit University College, London, and the Royal Cancer Hospital, London, during February to September 1960, to study new techniques and particularly those concerned with the structure, behaviour and functioning of biological macro-molecules: **Dr. E. H. Mercer,** of the Chester Beatty Research Institute, London, to carry out an electron microscopic study of cell division and differentiation in plants, at Sydney, from February to July 1960.

● **Mr. E. Hartles,** commercial director of McKechnie Brothers, Ltd., has been appointed assistant managing director.

● **Mr. J. G. Ashworth** has been appointed buyer in charge of the purchasing department at the Stone factory of Quickfit and Quartz Ltd., manufacturers of interchangeable laboratory glassware.

● **Mr. H. W. Graesser-Thomas,** founder in 1928 of H. W. Graesser-Thomas Ltd., has been elected Master of the Horners, one of Britain's most ancient craftsmen's guilds and now associated with the plastics industry.

Graesser-Thomas Ltd. are well known

H. W. Graesser-Thomas, who has been elected Master of the Horners

as distributors of phenolic raw materials to the plastics industry and also as suppliers of fine chemicals, particularly bulk aspirin for tabletting.

Beside his interests in the plastics industry (he is a Fellow of the B.P.F.) Mr. Graesser-Thomas is sales director on the board of the Wrexham Lager Brewery, first to be built in Britain and now part of the Ind-Coope group.

● **Mr. R. D. Douglas,** barrister-at-law, has been appointed assistant company secretary of Pfizer Ltd., and Universal Laboratories Ltd., both of whom are members of the Pfizer group.

● **Mr. D. G. Furzey** has relinquished his position with Monsanto Chemicals Ltd. to take up an appointment as chief engineer with S.D. Plants Ltd. at their head office at Bush House, Aldwych, London W.C.2.

● **Mr. O. D. Myrick, Jr.,** has been appointed director of development planning for the Grace Chemical Group of W. R. Grace and Co., New York, U.S. Mr. Myrick was affiliated with Grace's Davison Chemical Division, formerly The Davison Chemical Co., for 18 years in various positions in the fields of engineering and research and development. He has been manager of development for the division since 1953 and director of development planning since 1957.

● **Dr. W. F. Stephen** and **Mr. I. D. Rattee,** of I.C.I.'s Dyestuffs Division, have been awarded the Gold Medal of the Society of Dyers and Colourists for their work in connection with the invention and development of the Procion dyes, the first commercially available reactive dyes for cellulosic fibres. They were jointly responsible for this discovery at Dyestuffs Division, Blackley, Manchester, some four years ago, and will be presented with their awards at the Society of Dyers and Colourists' annual dinner in Leeds on 29 April. A former main board director of I.C.I., **Dr. C. J. T. Cronshaw,** who retired from I.C.I. in 1952, has been awarded the Society's Perkin Medal "as a leader under whose enthusiastic guidance the phthalocyanine pigments and derived textile dyes were first made available and their basic constitution established for all to see".

Will

Sir Henry Thomas Tizard, G.C.B., A.F.C., F.R.S., who died on 9 October last, left £29,788 net (duty paid £4,483).

In Parliament

Voluntary Ban on Use of Alkali Arsenites in Agriculture

VOLUNTARY agreement for the ceasing forthwith of the production of alkali arsenites for use in this country as haulm destroyers and weedkillers, announced in CHEMICAL AGE, 16 January, p. 129, was referred to by Earl Waldegrave, Parliamentary Secretary to the Ministry of Agriculture, in the Lords last week. After this year's potato harvest, these arsenites will be withdrawn from use. In the meantime the most stringent safety precautions are to be observed. The use of lead arsenate and of arsenical sheep dips, as already indicated, are not affected.

Other forms of arsenic for use as agricultural chemicals, which do not present such a hazard, will continue to be used under the usual precautions. In reply to questions, Earl Waldegrave said that the use of arsenites over the one remaining season would give a period for the commercial development of less toxic substances. There was to be no ban on the use of organo-phosphorus insecticides, for which the field of risk was not nearly so wide as in the case of the alkali arsenites.

Dollar Imports of Synthetic Rubber Freed

In a written answer to questions relating to removal of duties on dollar imports, Mr. R. Maudling, President of the Board of Trade, stated that synthetic rubber was removed from such control with effect from 1 February.

Proceedings Begun Following Potassium Cyanide Mishap

Police have begun proceedings under the Motor Vehicles (Construction and Use) Regulations, 1955, in connection with a recent incident when 300 lb. of cyanide of potassium fell off a lorry on route from London to Kidderminster (see CHEMICAL AGE, 16 January, p. 143). These regulations require loads to be secured to prevent falling and prohibit the use of unsuitable vehicles. This was stated by Mr. D. Renton, Joint Under-secretary of State for Home Affairs, in the House last week. Four M.P.s had tabled questions, three calling for legislation to ensure adequate control over the carrying of poisonous substances by road.

Mr. Renton said there had been no report of any person or animal suffering any ill effects. The Poisons Rules, 1952, provided that it should not be lawful to consign any poison for transport unless it was sufficiently stoutly packed to avoid leakage arising from the ordinary risks of handling and transport.

Lurgi Gasification Process is the Most Economical

Asked what methods of coal gasification were now ready for use and which were British in origin, Mr. Richard Wood, Minister of Power, on Monday said that most of the new processes now available originated abroad. The Lurgi method, was, he said, "the most economical so far discovered for the total gasification of coal".

Replying to a written question on the same day, he said that the Coleshill Lurgi plant was expected to make gas at a competitive price. He would gladly consider any similar proposals which might be included in the future development programme of area boards.

Gas Council Spending on Gasification Research

This year the Gas Council would spend £120,000 on research into coal gasification, about £230,000 on research into oil gasification under a programme designed to contribute towards improving the economics of coal gasification, and a further £240,000 on research into problems of gas purification and the treatment of by-products. This was stated by Mr. Richard Wood, Minister of Power, in the Commons on Monday.

The Gas Council research department is now examining one of three methods for reducing toxicity of gas with a view to improvement and to making it an economic proposition.

Commercial News

- **Boake, Roberts Recommend Albright Bid**
- **Hickson Raise Dividend on Higher Profit**
- **Mitchell Cotts Acquire C. Windschuegl**
- **U.S. Borax Develop Boron Trichloride**

Albright and Wilson

The directors of Boake, Roberts and Co. (Holding) Ltd. have unanimously recommended acceptance of the formal offer made by Albright and Wilson for the company's Ordinary and 5% preference capital. There are today, it is stated, significant benefits to be derived from size, particularly in the chemical industry, where research and development expenditure must often be large to be effective. If the offer for the ordinary stock becomes unconditional Mr. F. G. Pentecost, chairman of A. Boake, Roberts, will be invited to join the board of Albright and Wilson, it is reported. The offer closes on 22 February.

Trading results of Albright and Wilson showed an improvement over the August 1959 forecast and profits before tax for the second half of 1959 are now estimated to be well over those for the first half of last year. Profits before tax for the six months to the end of June 1959 were £2,225,000, and the expected dividend equivalent is 18.3% (13.6%).

Group profits of Boake, Roberts before tax for the half year ending March 1960 are expected to be considerably better than those for the previous half year, when the profit before tax amounted to £185,700.

Berry Wiggins and Co.

A second interim dividend in lieu of a final has been announced by Berry Wiggins and Co. oil refiners, etc., of Field House, Breams Buildings, Fetter Lane, London E.C.4. The amount is 11¼% on capital increased by a 19-for-100 rights issue, making a total, with the first interim already paid on the smaller capital, of 16¼% for 1959 (15%).

British Cellophane

A subsidiary of Courtaulds, British Cellophane Ltd., have acquired the share capital of Donaldson and Filer Ltd., Glasgow, a private company making fine corrugated paper and also acting as printers and bag-makers of cellulose film. British Cellophane have also acquired the share capital of Pretoria Paper Products (Pty.) of Port Elizabeth and Johannesburg. This company prints and makes bags of film, paper and similar packaging materials.

Hickson and Welch

Dividend of Hickson and Welch (Holdings) is being raised from 14.8% to 16% with a final of 12% on ordinary for the year to 30 September. Group profit was £568,020 (£547,223) with net profit of £329,966 (£260,624).

Durapipe Incledon Merger

A merger has been arranged between Durapipe and Fittings Ltd. and the plastics division of H. Incledon and Co. Ltd. Both companies are in the Incledon and Lamberts Ltd. group, and the integration of their plastics activities has been arranged with the object of increasing efficiency and improving the service to customers. The combined organisation will operate from the present address at Winnock Road, West Drayton, Middlesex.

Metal Propellors

Metal Propellors Ltd., of Croydon, Surrey, specialists in design and fabrication of plant in stainless steel and other alloys, have acquired the Standard Steel Co. (1929) Ltd., also of Croydon. The latter firm are steel stockists and constructional and mechanical engineers.

Mitchell Cotts

Amber Chemical Industries Ltd., 11a Albemarle Street, London W.1. have disposed of their controlling interest in Charles H. Windschuegl Ltd., merchants and importers, to Mitchell Cotts and Co. Ltd. The agreement, which has been backdated to 30 November, 1959, is a consequence of the policy of the Amber Group, of which Amber Chemical Industries Ltd. is the holding company, of concentrating its resources on the expanding industrial oil, surface armouring and fuel improver divisions of the group.

Quickfit and Quartz

A 20% rise in sales last year is reported by Quickfit and Quartz. Exports went up by 40% on the year and home sales increased by 10%. Sales director, Mr. E. L. Harrison, says that overseas sales have been particularly encouraging. Not only has 1959 been a record year for the company, but turnover has been increased every year since its formation in 1934.

Allied Chemical

Net income for 1959 for Allied Chemical Corporation, U.S., was $50,041,000 or $2.51 per share ($34,226,000 or $1.72).

Algemene Kunstzijde-Unie

Algemene Kunstzijde Unie N.V. (A.K.U.) of Holland state that their 1959 turnover was higher by almost 25% over 1958. Gross profit in the first three quarters of the year was as high as that reported for the whole of the year 1958. The 1959 results may be estimated from the 1958 total turnover of Fl.233,100,000 (some £22 million) and a net profit of Fl.21 million, or £2 million.

U.S. Borax Earnings

Net sales of $15,704,970 ($14,523,578) are reported for the three months ended December 1959 by United States Borax and Chemical Corporation, the operating company of Borax (Holdings) Ltd., with net income of $1,256,909 ($1,093,248).

The sales figure was 8% higher than in the same three months of 1958 and established a record for that period.

Demand for potash and the company's consumer products sold under the 20 Mule Team trademark was well maintained, although prices for potash remained unsatisfactory. Future sales outlook for the company's products is reportedly promising.

During the quarter, U.S. Borax Research Corporation, the company's wholly owned subsidiary, and the Dow Chemical Co. successfully completed their joint venture to develop an economic process for the manufacture of boron trichloride. This product should have future value as a highly reactive intermediate from which many of the advanced boron compounds can be made.

Reichhold Chemie AG

Reichhold Chemie AG report a 1959 increase in turnover of 23% to DM.33 million, or about £2.75 million. During the year the record sum of DM.4.7 million (about £400,000) was invested, mainly in the expansion of installations for chemical base production.

LONDON GAZETTE

Winding-up Petition

H. E. Helman and Co. (Insecticides) Ltd. A petition for the winding-up of this company has been presented by Stewart Skingle Ltd., 42 Brook Street, London, and is directed to be heard at the Royal Courts of Justice, London W.C.2, on 8 February.

NEW COMPANIES

ANTIGEN LABORATORIES LTD. Registered 13 January. Cap. £25,000. To manufacture, conduct research, diagnose, analyse chemicals. Solicitors: Bliss, Sons and Covell, High Wycombe. Reg. office: 19 Eastcheap, London E.C.3.

NUCLEAR FUELS LTD. Cap. £100 in £1 shares. To acquire and hold shares, stocks; to manufacture and deal in and act as agents for nuclear fuels and chemical products of all kinds, and as metallurgists, etc. Solicitors: Slaughter and May, 18 Austin Friars, London E.C.2.

UPSIL LTD. Cap. £100. To purchase, sell and distribute chemical products, metal alloys, etc. Directors:- P. Gignoux, P. J. A. Bourgois, K. Williams, A. Weil, J. C. Baron and C. A. Roy. Registered office: Marshgate Lane, Stratford, London E.15.

INCREASE OF CAPITAL

LAWES CHEMICAL CO. LTD., Creeksmouth, Barking, Essex. Increased by £350,000 beyond the registered capital of £400,000.

TRADE NOTES

Reduced Furnace Prices

In announcing 'substantially lower prices' for their Petro-Chem furnaces for the oil and chemical industries, Birwelco Ltd., of Birmingham, outline a number of factors which have contributed towards the reductions.

Among these are more competitive prices for finished steels, etc., easing of currency restrictions and threat of more competition from the Common Market. The company's recent formation of a subsidiary within the C.M. is also stated to have been instrumental in the lowering of the Petro-Chem Iso-Flow furnace prices.

Insecticidal Paints

A new range of insecticidal paints introduced by J. Manger and Son Ltd., London, incorporates aldrin and dieldrin manufactured by the Shell Chemical Co. Ltd. The new paints, developed to give a high-class finish, are available in colours or as a clear varnish.

Gordon Flowmeters

Latest developments in the James Gordon and Co. Ltd. range of flow metering equipment are described in a colour leaflet obtainable from the company at Dalston Gardens, Stanmore, Middlesex.

New A.E.I. Electric Motors

An addition to their range of industrial motors is announced by A.E.I. Ltd., Motor and Control Gear Division. Use of improved insulation is said to have made possible a motor of smaller dimensions at a lower price than earlier models: particulars from the Division's Publicity Department, Crown House, Aldwych, London W.C.2.

Import Licensing Branch Moves

The functions of Import Licensing Branch are being transferred to the Tariff and Import Policy Division of the Board of Trade and the offices in Marsham Street, London, were closed from 25 January. Applications and inquiries relating to import licensing should now be addressed to the B.o.T. Tariff and Import Policy Division, Horse Guards Avenue, London S.W.1.

Pneumatic Control Systems

Hamilton Controllers Ltd., 27 Clevehurst Close, Stoke Poges, Bucks, have been formed to simplify the compressed air circuits used in industry. The system draws in all controlling valves, regulators, timers, air line lubrication and filters, etc., into one compact cabinet or console. The company designs and manufactures both for standard and special applications and is not limited to the use of valves of any one manufacturer.

French Equipment in U.K.

An arrangement has been made between Cockburns Ltd., of Cardonald, Glasgow, and Rotterdam; and the French firm, Ateliers et Chantiers de Bretagne of Paris, whereby the Glasgow company will manufacture certain of the French firm's units, including compressors and evaporators. In addition, a reciprocal agreement has been made for Chantiers to make Cockburn products for marine, industrial and atomic applications in France. They will also act as Cockburn's selling agents for France and Algeria.

Refractory Glazes

Marketing Network Services Ltd., 9 Blenheim Street, London W.1, announce their appointment as sole agents throughout the U.K. for the new Furnaze refractory glazes manufactured by Crownamics Ltd., Charlton, London S.E.7. The material is supplied in easy-to-handle pail type drums of 5 gall. capacity, and the standard general-purpose grade, 12 S, is priced at 70s per gallon, including free drum and carriage U.K.

Titanium Pigments

A colour-printed leaflet describing properties and applications of their range of titanium pigments is available from British Titan Products Co. Ltd., 10 Stratton Street, London W.1.

Change of Address

The London office of Beldam Asbestos Co. Ltd., and Auto-Klean Strainers Ltd. is now at 109 Fenchurch Street, E.C.3.

'All-Stabilo' Pencil

The Swan All-Stabilo pencil which writes on glass, transparent film and glazed surfaces is now being marketed in six colours—red, white, blue, black, yellow and green. The original black-lead version was introduced last year by the Plastic Packaging Division of Gordon and Gotch Ltd., 75-79 Farringdon Street, London E.C.4. The colour pencils write with the same clearness and density as the black lead; and have been used without softening or turning brittle over a temperature range of 30°-100°F.

Exsud Agents for Kemikalija

Exsud (South American Minerals and Products Co. Ltd.), 26-27 Cowcross Street, London E.C.1, have been appointed sole distributors in Great Britain by Kemikalija of Zagreb for mercury dichloride.

Re-Organisation at B.P. London Office

THREE new departments are now operating in the London office of the British Petroleum Co. Ltd., Britannic House, Finsbury Circus, London E.C.2, having been formed from the three divisions of the ex-refineries and technical department.

Refineries division now becomes refineries department, and the research and development division is re-named research and technical department. The patents licensing and trade-marks branch becomes patents and trade marks division and engineering division is re-titled engineering department.

DIARY DATES

MONDAY 8 FEBRUARY

C.S.—Dundee: Chemistry Dept., Queens College, 5 p.m. Lecture by Prof. C. A. Coulson.
C.S.—Durham: Science Laboratories, South Rd., 5 p.m. 'Anti-knock action of tetraethyl-lead', by Prof. A. D. Walsh.
C.S.—Leicester: University, 4.30 p.m. 'Alkali-metal derivatives of organic and organometallic compounds', by Prof. G. E. Coates.
C.S.—Oxford: Inorganic Chemistry Lab., University, 8.15 p.m. 'Behaviour of electrons in molecules', by Dr. J. W. Linnett.
Plastics Inst.—Leicester: Grand Hotel, 6.45 p.m. 'Adhesives for the packaging industry', by F. H. Garside.

TUESDAY 9 FEBRUARY

C.S.—Manchester: Chemistry Dept., University, 4 p.m. 'Looking for new drugs', by Dr. F. L. Rose.
Inst. Plant Eng.—Manchester: Engineers' Club, Albert Sq., 7.15 p.m. 'Problems in chemical engineering maintenance', by J. C. Veale.
R.I.C.—London: Sir John Cass College, Jewry St., E.C.3., 6 p.m. 'Reaction mechanisms', by Prof. E. D. Hughes.
Soc. Instrument Tech.—Manchester: Central Library, St. Peter's Sq., 6.45 p.m. Symposium on 'Moisture measurement'.

WEDNESDAY 10 FEBRUARY

Inst. Fuel.—Manchester: Engineers' Club, Albert Sq., 2.30 p.m. 'Rocket fuels', by Prof. A. D. Baxter.
Plastics Inst.—Leeds: St. Mark's House, 186 Woodside Lane, 7.15 p.m. 'Polyester resin applications in industry', by K. A. Scott.

THURSDAY 11 FEBRUARY

C.S.—London: Royal Institution, Albemarle St., W.1., 7.30 p.m. 'Hydrocarbon-metal carbonyls', by Prof. P. L. Pauson.
R.I.C.—Dartford: College of Technology, Miskin Rd., 7 p.m. 'Cementing action', by Prof. J. D. Bernal.
S.C.I. with C.S. & R.I.C.—Bristol: Chemical Dept., University, Woodland Rd., 6.30 p.m. Liversedge Lecture: 'Ionic crystals and their melts', by Prof. A. R. J. P. Ubbelohde.
S.C.I.—Liverpool: College of Technology, Byrom St., 7.30 p.m. 'Recent research on the corrosion and protection of iron and steel', by Dr. J. C. Hudson.
Soc. Instrument Tech.—London: Manson Hse., 26 Portland Pl., W.1, 6.30 p.m. 'Measurement, automatic control, and data reduction as applied to a cyclic plant', by T. A. Lucas.

FRIDAY 12 FEBRUARY

Bradford Chem. Soc.—Bradford: Institute of Technology. Symposium on 'Recent developments in textile chemistry' and exhibition of apparatus.
C.S.—Southampton: Lecture Theatre, Engineering Dept., University, 5 p.m. Tilden Lecture: 'Hydrocarbon-metal carbonyls', by Prof. P. L. Pauson.
Inst. Physics—London: 47 Belgrave Sq., S.W.1, 2.30 p.m. 'Interferometric spectroscopy', by Dr. J. Ring and Dr. H. A. Gebbie.
Inst. Physics—Swansea: University College, 5.15 p.m. 'Physics of fully ionized gases', by Dr. H. T. Miles.
O.C.C.A.—Manchester: Nag's Head Hotel, Jackson's Row, 6.30 p.m. 'Microbiological attack of paint films', by P. Whiteley.
R.I.—London: 21 Albemarle St., W.1, 9 p.m. 'Fuel cells: will they soon become major sources of electrical energy?', by F. T. Bacon.
S.C.I.—Manchester: Chemistry Dept., University, 6.30 p.m. 'Properties of silicones applied to textiles and papers', by Dr. M. R. Porter.
Soc. Glass Tech.—St. Helens: Gamble Institute, 6.15 p.m. 'The changing industrial picture', by Sir Harry Pilkington.
Soc. Instrument Tech.—Birmingham: Byng Kendrick Suite, College of Technology, Aston St., 7 p.m. 'Automatic weighing', by R. W. Seymour-Lee.

Russian Coke and Chemistry Journal in English

The Russian technical journal 'Koks i Khimiya' is being translated into English and published monthly under the title of 'Coke and Chemistry User' at an annual subscription rate of £5 5s. The translation is sponsored by the Department of Scientific and Industrial Research and is produced by the Coal Tar Research Association, Oxford Road, Gomersal, Leeds, with the British Coke Research Association.

New Polymerisation Accelerator for Unsaturated Polyester Resins

AN extensive range of organic peroxides for curing unsaturated polyester resins has been developed by Novadel Ltd., St. Ann's Crescent, Wandsworth, London S.W.18. At room temperature and up to 70°C it is usually necessary to use an accelerator in conjunction with the peroxide catalyst for the cure to take place in reasonable time. Several accelerators are supplied by Novadel, particularly for use with unsaturated polyester resins. Literature available on this subject, however, does not sufficiently describe the range and uses of the products now marketed, and hence Novadel have prepared a small booklet dealing with several aspects of these products. Some new products are also under investigation and details will be released in due course.

Novadel supply a range of cobalt accelerators based on cobalt Siccatol, derived from a pure organic acid. These accelerators are stated to be of uniform quality and have a guaranteed metal content and purity. It is claimed that compared with cobalt naphthanate, cobalt Siccatol's loss of activity is far less noticeable and also shelf life is longer.

These accelerators are applied in the polymerisation of polyester resins with peroxides and hydroperoxides derived from aldehydes and ketones at room temperature and up to 70°C (158°F). At temperatures from 70°C to 100°C (158°F to 212°F) a *small* addition of accelerator may also be useful. Thus the following organic peroxides—methyl ethyl ketone peroxide (Butanox), cyclohexanone peroxide (Cyclonox), methyl isobutyl ketone peroxide (Trigonox HM-80) and cumene hydroperoxide (Trigonox K-70) are accelerated by NL-49, NL-51 and NL-53 at temperatures up to 70°C.

With diacyl peroxides at room temperature and up to 70°C (158°F) a tertiary amine accelerator is advised. Novadel supply accelerators of this type based on dimethyl and diethylaniline and dimethyl paratoluidine. These are used with the following Novadel organic peroxides for polymerisation at temperatures up to 70°C—benzoyl peroxide (Lucidol)—p-chlorobenzoyl peroxide (Perkadox SC), 2,4-dichlorobenzoyl peroxide, and lauroyl peroxide (Lauroydol).

Although tertiary amine accelerators have not affected polymerisation with hydroperoxides and peroxides derived from ketones and aldehydes alone, addition of NL-63 or NL-65 to a ketone peroxide/cobalt accelerator system is stated to result in shorter gel time.

Gelation agents based on lauryl mercaptan for use with organic peroxides have also been developed by Novadel. Unlike the cobalt derivatives and tertiary amines, heat is required to complete polymerisation.

Polyester resin using NL-70 is rapidly converted to a soft solid state. Curing however, is slow at room temperature and the resin will remain in a flexible state for a long period. For more rapid curing a temperature in excess of 60°C (140°F) is required.

NL-70 has been specially developed for the cure of acrylic resins, e.g. methyl or lauroyl peroxides methacrylate, at room temperature with benzoyl.

Market Reports

EXPORT LEVELS STILL SATISFACTORY

LONDON Trading conditions on the chemicals market have shown little change during the week. Home industrial users are taking steady deliveries against contracts, and there has been a good volume of new inquiry for both spot and forward delivery. Export trade activity continues at a satisfactory level. The official returns for 1959 show the total of British chemical exports to be £31 million over the previous year.

There has been no noticeable expansion in demand for fertilisers but basic slag is an active market. The price of copper sulphate was increased as from 27 January to £82 per ton, but the general price position is steady and unchanged.

The coal tar products market has no outstanding feature and most items are in good request and the undertone firm.

MANCHESTER The contract movement of most descriptions of chemicals to users in the Lancashire areas during the past week has been maintained at a satisfactory level and a fair number of fresh inquiries have been circulating. The export demand is also on steady lines, with Commonwealth outlets prominent, shipments covering a wide range of products. Prices generally are on a steady basis, with few actual changes to report. Sulphate of copper has further stiffened slightly to £82 per ton, f.o.b. Liverpool. There is a fair movement of compounds and other fertiliser materials.

SCOTLAND With a background of fairly steady and firm prices, business during the past week in the Scottish heavy chemical market has again maintained a good level. Buying has been brisk and demands have not only been confined to the basic heavy chemicals, but have covered quite a varied range. There is still a fair volume of inquiries being received for immediate and forward requirements. Interest too has been shown in regard to imports during the week. Exports still remain at a good level and here again the chemicals involved have been varied.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATION

On Sale 20 January

Improved process for producing insulin preparations with protracted effect. Novo Terapeutisk Laboratorium Aktieselskabet. **709 927**

2-Acylamino-1-aryl-propane-1, 3-diols. Centre National De La Recherche Scientifique. **719 103**

Azaphenthiazine derivatives and their preparation. Societe Des Usines Chemiques Rhone-Poulenc. **797 061**

Catalytic reforming of hydrocarbons and apparatus therefor. Gas Machinery Co. **803 788**

Production of chloramphenicol and similar compounds. May, P. **811 846**

ACCEPTANCES

Open to public inspection 16 March

Precipitating tantalum and/or niobium compounds from ketonic solutions. Gesellschaft für Elektrometallurgie, and Starck AG, H. C. **830 660**

Processes for production of graphite. General Electric Co. Ltd. **830 662**

Method and apparatus for homogenising molten glass. Owens-Illinois Glass Co. **830 450**

Process for oxidising gluteraldehydes. Union Carbide Corp. **830 671**

Dry preparations capable of yielding cation-active melamine resin solutions by dissolution in water. Ciba Ltd. **830 620**

Dryer for granular, fibrous and like material. Proctor & Schwartz Inc. **830 470**

Coal tar and like emulsions. Gelsenkirchener Bergwerks-AG. **830 521**

Polymerisation catalysts. Imperial Chemical Industries Ltd. **830 424**

Self-propelling pharmaceutical compositions. Riker Laboratories Inc. **830 426**

Medicament dispensing and administering apparatus. Riker Laboratories Inc. **830 427**

Process for producing glutamic acid. Ajinomoto Co. Inc. **830 698**

Apparatus for measuring moisture-content of materials. Townson & Mercer Ltd. **830 525**

Work hardening metal components. Glacier-Metal Co. Ltd. **830 244**

Water-soluble sulphonamide dyestuffs. Imperial Chemical Industries Ltd., Price, R., Reece, C. H., and Wardleworth, J. **830 246**

Olefin polymerisation catalyst and process. Phillips Petroleum Co. **830 247**

Grain-stabilising of metals and alloys. Johnson, Matthey & Co., Ltd. **830 628**

Production of lactams from oxime hydrochlorides. Badische Anilin- & Soda-Fabrik AG. **830 630**

Recovering noble metals. Osterreichische Stickstoffwerke AG. **830 674**

Interpolyamides. Imperial Chemical Industries Ltd. **830 676**

Polymerisation of alpha-olefins. Sun Oil Co. **830 533**

Composition having bleaching, sterilising and disinfecting properties, and method of preparation thereof. Hedley & Co. Ltd., T. **830 753**

Apparatus for isolating oil-polluted water surfaces and oily fibres on the surface of water, especially in harbour basins. Schuback, G. **830 701**

Production of phenothiazine derivatives. Farbenfabricken Bayer AG. **830 563**

Device for controlled dispersions of a liquefied gas from a pressurised container. Thermodyn GmbH. **830 703**

Reduction of titaniferous ores. Halversen, R. A. **830 707**

Piperidinecarboxamide derivatives. Searle & Co., G. D. **830 709**

Preparation of diamine-N-N¹-bis-phosphoric and thionophosphoric acid derivatives. Benckiser GmbH, Chemische Fabrik, J. A. **830 714**

Vessels for transport of liquefied gases. Anciens Chantiers Dubigeon S.A. Des, and Leroux, R. **830 570**

Production of acetylene and ethylene. Wulff Process Co. **830 574**

Preparing sodium aluminium hydride. Metal Hydrides Inc. **830 717**

Salts of arylguanidines with aryldiazosulphonates or with aryltetrazodisulphonates. General Aniline & Film Corp. **830 306**

Electrolytic polishing of zirconium, hafnium and their alloys. Carborundum Co. **830 718**

Analgesic compounds. Ravensberg GmbH. **830 577**

Beaded carbon black. Columbian Carbon Co. **830 579**

Production of coatings on metallic surfaces. Pyrene Co. Ltd. **830 632**

Measurement of the partial pressure of the water vapour of liquids. Farbwerke Hoechst AG. **830 548**

Coating compositions. Midland Silicones Ltd. **830 310**

Coated films and their production. Du Pont de Nemours & Co., E. I. **830 311**

Union-dyeable fibre blends. Dow Chemical Co. **830 634**

Preparation of azelaic acid semi-ester suitable for making civestone dicarboxylic acid. Council of Scientific & Industrial Research. **830 637**

Injection solution of 2-methyl-2-N-propyl-1, 3-propanediol dicarbonate. Detzel, A. **830 320**

Process and apparatus for comminuting and separating purposes. Hischmann, R., and Hischmann, H. [trading as Hischmann, Geb.] **830 582**

Compositions suitable as lubricating oil additives. Esso Research & Engineering Co. **830 727**

Process for reducing iron oxides. Inland Steel Co. **830 592**

Nickel-plating by chemical means. Dow Chemical Co. **830 597**

Process for preparation of secondary alcohols. Bataafsche Petroleum Maatschappij N.V. De. **830 369**

Water-in-oil emulsion lubricant and hydraulic fluid. Bataafsche Petroleum Maatschappij N.V. De. **830 731**

Phenylacetic acid esters, their production and compositions containing them. Laboratoires Dausse. **830 735**

Catalytic reforming process. Socony Mobil Oil Co. Inc. **830 439**

Cobalt alloys. Sierra Metals Corp. **830 649 & 830 737**

Thermal treatment of aqueous liquors. Makhtsavei Israel. **830 738**

Method and apparatus for preparing natural gas for liquefaction. Constock Liquid Methane Corp. **830 740**

Open to public inspection 23 March

Production of gases containing acetylene, ethylene, carbon monoxide and hydrogen. C.U.R.A. Patents Ltd. [Cognate application 20 892.] **831 115**

Gasification of hydrocarbon-containing oils. Gas Council. **830 960**

Method of water purification. Thompson-Kennicott Ltd., J. [Cognate application 7 441.] **830 964**

Process for dyeing polyamide or polyalkalene terephthalate fibres. Howards of Ilford Ltd. **831 141**

Production of synthesis gas rich in hydrogen. Power-Gas Corporation Ltd. **831 263**

Cross-linking liquid copolymers of diolefins. Dunlop Rubber Co. Ltd. **831 061**

Method of and apparatus for carrying out exothermic chemical reactions involving gases and/or liquids. Farbwerke Hoechst AG. **831 118**

Manufacture of polyethylene polysulphide. Farbwerke Hoechst AG. **831 143**

Production of coke and gaseous unsaturated hydrocarbons. Lummus Co. **830 968**

Metalliferous monoazo dye complexes to colouring preparations containing them and diazoamino compounds and to their use in the colouration of cellulosic textile materials. Compagnie Francaise Des Matieres Colorantes. **830 970**

Film-forming composition with plasticiser. Soc. Industrielle de la Cellulose (Sidac) S.A. **831 120**

Δ' Steroids and their preparation by a microbiological process. Merck & Co., Inc. **830 921**

Uracil derivatives. Armour & Co. **831 067**

Gas diffusion electrodes and a process for their production. Ruhrchemie AG., and Steinkohlenelektrizitaet AG. **830 922**

Refining of crude petroleum oil. Padovani, C., and Berti, V. **830 923**

Producing shaped articles from polyethylene. Farbwerke Hoechst AG. **830 924**

Producing single crystals of silicon and single crystals of silicon when produced by the process. Sylvania-Thorn Colour Television Laboratories Ltd. **830 926**

Corrosion inhibitors. Standard Oil Co. **831 068**

Process for working up polyolefins. Farbwerke Hoechst AG. **831 123**

Production of solid polyethylene. Badische Anilin- & Soda-Fabrik AG. **831 145**

Analgesic compounds. British Schering Ltd. **831 071**

Purification of collagen. Bloch, A., and Oneson, I. B. **831 124**

Steroid compounds and the preparation thereof. Pfizer & Co. Inc., C. **831 073**

Recovery of low boiling hydrocarbons. Still, K. F. [trading as Still, C. [Firm of]]. **830 972**

Recovery of gases enriched in hydrocarbons having two or more carbon atoms from gases having a low content thereof. Still, K. F. [trading as Still, C. [Firm of]]. **831 147**

Fermentative production of antibiotics. Belik, E., Doskocil, J., and Herold, M. **831 125**

Peroxide-cured polyethylene. General Electric Co. **831 126**

Manufacturing of copolymers of acrylonitrile. Farbwerke Hoechst AG. **830 898**

Manufacture of monoazo-dyestuffs containing cobalt. Farbwerke Hoechst AG. **831 128**

Process and apparatus for recovering polymers. Phillips Petroleum Co. **830 974**

Resin-coated glass-reinforced plastics. Food Machinery & Chemical Corp. **830 975**

Neutralising vegetable or animal oils. Vaccarino, V. and Vaccarino G. **830 976**

Irradiated polyethylene. General Electric Co. **830 899**

Coated tablets. Evans Medical Supplies Ltd. (Kilian & Co., GmbH.). [Addition to 744 799.] **831 074**

Pest-combating preparations. Ciba Ltd. **831 075**

Process for manufacture of molecular sieve adsorbents. Union Carbide Corp. **831 076**

Stables lattices and preparation thereof. Goodrich Co., B. F. **830 931**

Burner construction for the production of synthesis gas. Texaco Development Corp. **831 130**

Method of making methyl mercaptan. American Oil Co. **830 933**

Laminated thermoplastic polymeric materials. Imperial Chemical Industries Ltd. **830 901**